Accommodation Providers' Responses to Climate Change in Kyoto, Japan

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Abstract

Rising global concerns over climate change are one of today's major challenges to the tourism sector and its subsectors, such as the accommodation industry. Given the limited progress in understanding climate change in the Asian tourism context, this study explores the responses of Japan's accommodation providers in the Kyoto Prefecture to climate change adaptation and mitigation. The Kyoto Prefecture is regarded as an appropriate study location because of the association of the city with climate change governance and the city's own initiatives with respect to improving environmental quality. The study assesses four different types of accommodation which include hotels, *ryokan* (traditional Japanese-style inns), lodges, and love hotels. A content analysis of accommodation websites and other units of analysis including blogs and corporate social responsibility (CSR) reports were employed to achieve the goals of this study. A total of 1,150 accommodation providers' websites was analysed and the study found that a very small number of accommodation providers mentioned their green practices. Instead, more specific attributes of climate change responses were stated prominently on accommodation websites. The results reveal lack of disclosure of their environmental information in relation to measures to response to climate change.

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List of Abbreviations and Acronyms

A/C	air conditioning
BAU	business as usual
B&B	bed and breakfast
COP	Conference of the Parties
CSR	corporate social responsibility
EIA	Energy Information Administration
EMAS	Eco-Management and Audit Scheme
EMC	Eco-Model City
EMS	Environmental Management System
EU	European Union
GDP	gross domestic product
GHG	greenhouse gas
GIO	Greenhouse Gas Inventory Office of Japan
GPN	Kyoto Green Purchasing Network
GTERC	Global Tourism Economy Research Centre
HVAC	heating, ventilating and air-conditioning
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
JMA	Japan Methodological Agency
JNTO	Japan National Tourism Organization
JPY	Japanese yen
JTA	Japan Tourism Agency
KCTI	Korea Culture & Tourism Institute
LEED	Leadership in Energy and Environmental Design
LNG	liquefied natural gas
METI	Ministry of Economy, Trade and Industry
MHLW	Ministry of Health, Labour and Welfare
MLIT	Ministry of Land, Infrastructure, Transport and Tourism
MoE	Ministry of the Environment
NGO	non-governmental organization
NHL	natural hydraulic lime
PV	photovoltaic cell
RES	renewable energy supply
RF	radiative forcing
SLR	sea-level rise
UN	United Nations
UNEP	United Nations Environment Programme

UNFCCC	United Nations Framework Convention on Climate Change
UNWTO	United Nations World Tourism Organization
USD	Unites States Dollar
WECS	wind energy conversion system
WEF	World Economic Forum
WMO	World Meteorological Organization
WTTC	World Travel and Tourism Council
WWF	World Wildlife Fund
Chemical Abbreviations	
CH_4	methane
CO_2	carbon dioxide
HFC	hydrofluorocarbon
LPG	liquid petroleum gas
Nox	nitrogen oxides
PFC	perfluocarbon
UNITS	
CO_2-eq	carbon dioxide equivalent
kg	kilogramme
kWh	Kilowatt hour
L	litre
m^3	Cubic metres
MJ	mega joule
t	tonne
Gt	gigatonne

Chapter 1: Introduction

This chapter provides an introduction to the subject of tourism and climate change. It outlines the background to the science of global climate change and highlights how tourism is interrelated with climate change. This introduction aims to provide a broader picture of how climate change issues are part of important global concerns for sustainable tourism and the accommodation sector in particular.

1.1 Background to the Research

The focus of this research is the climate change mitigation and adaptation practices of accommodation providers in Kyoto, Japan. Climate change is arguably one of the most pressing issues facing the world today (Scott, Hall & Gössling, 2012). The failure to address climate change mitigation and adaptation has risen to the top of assessments of global and national business and societal risk (World Economic Forum [WEF], 2016). Climate change is placing greater pressure on ecosystems in ways that increase vulnerabilities with respect to water crises, food security, natural disasters and human health (Gössling, 2011; WEF, 2016). Increasing concern over climate change in recent international policy debates has been highlighted by the signing of the Paris Agreement at the 21st Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) by 196 nations (United Nations [UN], 2016). The Paris Agreement aims to reduce greenhouse gas (GHG) emissions to ensure global warming is restricted to "well below 2°C above pre-industrial levels" (UN 2016, article 2, p. 29).

Climate change is extremely important for tourism because of its widespread "influence on the economic viability of tourist destinations and activities, tourist behavior, and its ramifications for the entire tourism system" (Hall et al., 2015, p. 4). Tourism is a major sector of the global economy generating USD 1.5 trillion of the total value of international service exports including international passenger transport (United Nations World Tourism Organization [UNWTO], 2016). This represents 9.8% of global gross domestic product (GDP), which contributes 9.5% of employment in terms of direct and indirect jobs (World Travel and Tourism Council [WTTC], 2016b).

The understanding of relationships between tourism and climate change has attracted growing academic interest since the first publications in the 1980s (Gable, 1987; McBoyle et al., 1986, 1987; Wall et al., 1986). Nevertheless, major regional knowledge gaps persist in Asia, Africa and small islands, with the majority of research being conducted in Europe, North America, New Zealand and Australia (Amelung, Moreno & Scott, 2008; Becken, 2013a; Hall, 2008; Scott & Becken, 2010; Scott, Hall & Gössling, 2016). Despite research on tourism and climate change in the Asia region beginning to emerge, progress remains limited (Becken, 2013a; Scott et al., 2016; Su & Hall, 2014; UNWTO, United Nations Environment Programme [UNEP] & World Meteorological Organization [WMO], 2008).

1.2 What is Climate Change?

The global climate system is dynamic in nature as climate changes over time and geographical location from the local to the global scale (Scott et al., 2012). Descriptions of climate and related change are temporally and geographically specific (Hall, 2014a). The Inter-governmental Panel on Climate Change (IPCC, 2014a, p. 120, 121) defines two notions of changes in climate:

- climate variability – variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate on all temporal and spatial scales beyond that of individual weather events.
- climate change – a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings, such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use.

In this thesis, climate change refers to anthropogenic forcing. The phenomenon of climate change was recognised by the IPCC (2007a), which reported observed changes in the global climate system compared with the pre-industrial era. It is extremely likely (>95% likelihood of certainty) “that human influence has been the dominant cause of the observed warming since the mid-20th century” (IPCC, 2013a, p. 17). Human activities contribute to emissions of GHGs, particularly

carbon dioxide (CO_2) through fossil fuel burning, as well as methane (CH_4), nitrous oxides (NOx), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6).

1.3 Tourism and Climate Change

The tourism and climate change relationship is referred to by Jenkins and Nicholls (2010, p. 19) as "bidirectional". This represents tourism as being both potentially impacted by, and a significant contributor to, climate change (Gössling, 2011; Hall, 2014a; Scott et al., 2012; Simpson et al., 2008; UNWTO et al., 2008).

Tourism is deemed to be a highly vulnerable economic sector to climate change because of its large reliance on natural and climate resources as a vital factor in destination attractiveness, as well as air transport being reliant on oil (Gössling & Hall, 2006; Scott et al., 2012). The earliest studies on the implications of climate change for tourism that emerged in the mid-1980s explored the projected impacts of climate change on tourism destinations and socio-economic consequences, such as shifts in visitation patterns (IPCC, 2014b; Scott et al., 2012; Weaver, 2011). Based on empirical findings of most of these publications, climate change was soon recognised as posing a threat to tourism destinations' attractiveness and sustainability (Gössling & Hall, 2006; Scott et al., 2012). The impacts of climate change include snow and biodiversity losses; coral bleaching; sea-level rise (SLR); higher temperatures, including heat waves; and increases in the frequency and intensity of extreme weather events such as floods and droughts. Paradoxically, however, climate change impacts can turn into gains in some polar regions. Decreased sea ice and warmer climate enable tourists to have greater access to polar regions (Hall & Saarinen, 2010; Johnston, 2005). A common issue facing the tourism industry in these situations is the potential threat to promoted destination branding and images and the values on which they are based, and the potential negative changes in tourists' perceptions (Hall, 2014b; Tervo-Kankare, Hall & Saarinen, 2013).

Hall et al. (2015) highlight that the tourism industry is a significant and growing contributor to global climate change. Travel and tourism lead to emissions of GHGs which include carbon dioxide (CO_2) in particular, as well as methane (CH_4), nitrous oxides (NOx), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6) (UNWTO et al., 2008). As shown in Table

1.1, the majority of CO_2 emissions in tourism are primarily associated with the transport of tourists, with aviation responsible for 40% of tourism's overall emissions, followed by cars (32%) and accommodation (21%) (UNWTO et al., 2008). According to independent assessments by the UNWTO et al. (2008) and World Economic Forum (WEF) (2009), the proportion of tourism's contribution to global anthropogenic CO_2 emissions is estimated to be approximately 5% in the year 2005, without accounting for radiative forcing (RF). Importantly, the UNWTO et al. (2008) and WEF (2009) assessments of the contribution of the tourism sector to global warming, however, do not include the influence of non-CO_2 GHGs (Hall et al., 2015). A more accurate assessment of the sector's contribution to global climate change needs to be made by taking RF into account (IPCC, 2013b). With RF considered, given the uncertainty of RF particularly for aviation emissions, Scott, Peeters, and Gössling (2010) estimated that tourism contributed between 5.2% and 12.5% of all anthropogenic forcing in 2005, with approximately 8% as a best estimate (Gössling, Scott & Hall, 2013).

Table 1.1 Distribution of CO_2 emissions from tourism by sub-sector, 2005

Sub-sector	**CO_2(Mt)[1]**	**%**
Air transport	515	40
Car transport	420	32
Other transport	45	3
Accommodation	275	21
Activities	48	4
Total	**1,302**	**100**
Total world[2]	26,400	
Tourism contribution		**5**

Source: UNWTO et al. (2008)

Note

[1]The proportion of CO_2 emissions from each sub-sector is calculated without RF considered.

[2]IPCC (2007b)

CO_2 is the most significant GHG given that all tourism sub-sectors are highly dependent on fossil fuels, especially for aviation, ship-based transport and cars, as well as for accommodation (Gössling & Peeters, 2015). The major challenge in tourism's contribution to climate change lies in the sector's greater projected growth and the resultant future emissions growth (Gössling, et

al., 2013). Tourism emissions are anticipated to increase due to several trends associated with the sector's growth (Gössling, et al., 2013). Such trends include a rising number of people travelling; continuing to decline the real travel cost of travel; growing disposable income levels per capita leading to an increasing number of trips and average length of stays; growth in the average trip distance; and increasing energy intensity of transport modes used (Dubois, Peeters, Ceron & Gössling, 2011; Gössling, 2013; Gössling et al., 2010, 2013; Owens, Lee & Lim, 2010; Peeters & Dubois, 2010; Peeters & Landré, 2012; Peeters & Bongaerts, 2015; Scott et al., 2012). Table 1.2 provides a calculation of projected tourism emissions growth on the basis of a business-as-usual (BAU) scenario to 2035, which took into consideration changes in travel frequency, length of stay, distance travelled, and technological efficiency gains (Gössling et al., 2013). It has been estimated by UNWTO et al. (2008) that CO_2 emissions from tourism will rise by approximately 135% compared with 2005 levels, reaching 3.059 Gt CO_2 in 2035. These estimates are very similar to a projection for emissions growth by the WEF (2009), totaling 3.164 Gt CO_2 in 2035 (Gössling et al., 2013).

Table 1.2 Tourism sector emissions and mitigation targets (Gt)

Year	Emission estimates and BAU projections		Mitigation targets	
	UNWTO et al. (2008)	WEF (2009)	WTTC (2009)	
2005	1.304	1.476	-	
2020	2.181	2.319	0.98[1]	1.254[2]
2035	3.059	3.164	0.652[1]	0.94[2]

Source: Gössling et al. (2013)
Note
[1]Aspirational emission reduction targets are -25% in 2020 and -50% in 2035 (both from 2005 levels specified in UNWTO et al. (2008).
[2]Pathway that limits global average temperature increase to below 2°C; assuming CO_2 continues to representing approximately 57% (IPCC, 2007) of the median estimate of 44 Gt CO_2-e total GHG emissions in 2020 and 2035 (Rogelj et al., 2011) and the tourism sector continues to represent approximately 5% of global CO_2 emissions (UNWTO et al., 2008; WEF, 2009) over the same time frame.

Growth in the global tourism system is also apparent in accommodation capacity growth through land-use change, highlighting the accommodation sector as another important emissions sub-sector in tourism (Scott & Gössling, 2015; Scott et al., 2012). As illustrated in Table 1.3, it is projected that accommodation will rank second in terms of the amount of CO_2 emissions by 2035.

This is due to the fact that accommodation capacity is anticipated to grow and shift from low-energy intensity types of accommodation, such as bed and breakfast (B&B) and pensions, towards more luxurious and higher energy-intensity types of accommodation including resort hotels (Scott et al., 2010). According to the UNWTO (2012) dataset, there were globally an additional 6.9 million hotel rooms and other forms of accommodation establishments over the period 1995-2010. Hotels have been among the most well-known category of the accommodation sector, however, other forms of lodging, such as B&B and self-catering accommodation, represent a high proportion of accommodation businesses (Page, 2015; Warren & Becken, 2017). More than 80 categories of accommodation worldwide have been identified (UNWTO et al., 2008). Nevertheless, accommodation numbers on a global scale remain unknown due to the fact that many accommodation businesses in the form of small and informal operations are not usually reflected in official statistics (Warren, 2014). More importantly, recent systematic reviews by Hall et al. (2016) and Warren and Becken (2017) reached a similar conclusion that despite the extreme significance of these other accommodation categories in many destination contexts, little research has been done on their resource consumption and sustainable practices.

Table 1.3 Distribution of CO_2 emissions from tourism by sub-sector, 2005 and 2035

Sub-sector	2005		2035	
	CO_2 (Mt)	%	CO_2 (Mt)	%
Air transport	515	40	1631	53
Car transport	420	32	456	15
Other transport	45	3	37	1
Accommodation	274	21	739	24
Activities	48	4	195	6
Total	**1,307**	**100**	**3059**	**100**
Total world[1]	26,400			
Tourism contribution		**5**		

Note

[1]IPCC (2007b)

1.4 Tourism Growth and Climate Change in Asia

Asia is regarded as one of the fastest-growing and influential regions in domestic and international tourism in the world today (Hall, 2016b; UNWTO, 2016; UNWTO & Global Tourism Economy Research Centre [GTERC], 2014). Table 1.4 provides figures on international tourist arrivals for different regions of the globe, and the Asia-Pacific region welcomed 279.2 million tourist arrivals in 2015, with an increase of 6% from the previous year (UNWTO, 2016). Asia is characterised by forecasts of high rates of tourism growth over the next 20 years (Hall, 2016b). For example, the global market share of the Asia-Pacific in international tourism is forecast to increase at the strongest growth rate among UNWTO regions, from 23.5% in 2015 to 30% in 2030, with tourist arrivals expecting to reach 535 million (UNWTO, 2016).

Table 1.4 International tourist arrivals by region 1990-2015 (millions)

Year	World	Europe	Asia & Pacific	Americas	Africa	Middle East
1990	435	261.5	55.9	92.8	14.8	9.6
1995	527	304.6	82.1	108.9	18.7	12.7
2000	674	386.6	110.4	128.2	26.2	22.4
2005	809	453.2	154	133.3	34.8	33.7
2010	950	489.4	205.5	150.2	50.4	54.7
2014	1,134	580.2	264.3	181.9	55.3	52.4
2015	1,186	607.7	279.2	192.6	53.5	53.3

Source: UNWTO (2016)

Domestic tourism growth also plays an important role in the Asian tourism market and, for example, a growing number of middle-class population in China and India can afford to travel intra-regional and intercontinental travel (Lew & Li, 2016; Mura, 2016; Prayag & Das, 2016).

Due to its rapid growth, the Asian tourism industry is considered as “a key player in the regional response to climate change” (Su & Hall, 2014, p. 27). For example, growth in accommodation capacity over the past 15 years has been strong in the Asia-Pacific region with a 54% growth, in terms of absolute room capacity (Scott & Gössling, 2015). This region now has the third largest regional share of total number of hotel rooms, representing about 23% of hotel rooms (Scott & Gössling, 2015). As a consequence, carbon emissions from accommodation establishments in the

Asia-Pacific region are predicted to grow at the highest rate among regions from 29% in 2005 to 40% in 2035 (WEF, 2009). This highlights Asian accommodation establishments as a significant sub-sector to respond to global climate change, however, as previously noted, substantial gaps in knowledge remain with respect to climate change and tourism in the region in the accommodation sector.

By 2030, the Asia-Pacific region will contribute nearly half (46%) of global carbon emissions, while simultaneously facing a higher frequency and intensity of weather extremes at the same time (IPCC, 2007a, 2014b). Since many of the Asia-Pacific tourism businesses are highly dependent on natural resources, such as alpine areas, beaches, coral reefs, and forests, they are particularly vulnerable to climate change (Su & Hall, 2014). However, in many cases, these tourism businesses lack the adaptive capacity to negate the impacts of climate change (Su & Hall, 2014).

1.5 The Growth of Tourism in Japan

It is only since the 21st century that the term 'inbound' has become the "buzzword of tourism policies and industries" in Japan (Funck, 2016, p. 361). This is because domestic tourism has been the historical focus of Japan's tourism promotion, together with encouraging outbound travel in the 1980s and 1990s as a means of improving the trade balance with key export markets (Cooper, 2013a; Funck, 2013; Ministry of Land, infrastructure, Transport and Tourism [MLIT], 2012). Table 1.5 and 1.6 provide figures on the number of domestic and international visitor arrivals, respectively. The importance of the national promotion of domestic tourism is reflected in the considerably higher domestic tourist numbers compared to international visitors during the 2010-2015 period (Table 1.5 and 1.6). However, since 2003 and changed economic conditions, successive governments have recognised the need for inbound tourism growth to help boosting national and local economies (MLIT, 2012). As a consequence, the Japanese government turned its attention to attracting overseas visitors by introducing active inbound promotion policies in 2003, such as "Visit Japan Campaign" (MLIT, 2012; Soshiroda, 2005; UNWTO, 2015). An unprecedented growth in arrivals in 2015 meant a 47% increase from 2014, with Japan receiving a record 19.73 million international visitor arrivals (Otake, 2016; UNWTO, 2016). Notably, international arrivals in 2015 overtook Japanese outbound tourist numbers (16.21 million) for the first time in 45 years since Osaka's 1970 World Exposition (Japan National Tourism Organization

[JNTO], 2016a; MLIT, 2015b) (see Table 1.6). The international tourist expenditure has become proportionately significant and it recorded an increase of 71.5% in 2015, compared with the previous year, up to JPY 3.48 trillion (MLIT, 2015b). In March 2016, international visitor arrivals surpassed 20 million to achieve the national ambitious target of attracting 20 million foreign visitor arrivals by 2020 (JNTO, 2016b). The national government announced to double the targeted foreign visitor arrivals to 40 million by 2020, and 60 million by 2030 after the 2020 Tokyo Olympics, in order to further promote inbound tourism (Murai, 2016). In 2016, an estimated 24 million international tourist arrivals were recorded, with a growth rate of 21.8%, but at a lower rate than the previous year (JNTO, 2017).

Table 1.5 Japanese overnight and same-day visitors: 2010-2015 (millions)

Year	overnight visitors	same-day visitors	Total
2010	317.5	314.1	631.6
2011	313.6	299	612.6
2012	315.6	297.2	612.8
2013	320.4	310.5	631
2014	297.4	297.9	595.2
2015	313	291.7	604.7

Source: MLIT (2015b)

Table 1.6 International visitor arrivals in Japan and Japanese outbound tourists 2010-2016

Year	International tourist arrivals		Japanese outbound tourists	
	(million)	Change (%)	(million)	Change (%)
2010	8.6	26.8	16.6	7.7
2011	6.2	-27.8	17	2.1
2012	8.4	34.6	18.5	8.8
2013	10.4	24	17.5	-5.5
2014	13.4	29.4	16.9	-3.3
2015	19.7	47.1	16.2	-4.1
2016[1]	24	21.8	17.1	5.6

Source: JNTO (2011, 2012, 2013, 2014, 2015, 2016a, 2017)

Note
[1]Provisional figures

Japan's inbound tourism is arguably still in a development phase, as international tourists are heavily concentrated in so-called "golden routes", which refer to prefectures with the major tourist sites and international gateways, such as Tokyo, Osaka, and Kyoto (Funck, 2016; MLIT, 2015b, 2015c; The Japan Times, 2016b); this has caused a severe shortage of available hotel rooms in these prefectures (The Japan Times, 2016a). However, there has been an increase in the number of foreign visitor arrivals in prefectures surrounding the metropolitan areas, with a growth of 59.9% from 2014 to 2015, and this was higher compared to a growth rate of 41.6% in the metropolitan areas (MLIT, 2015b). Yabe (2016) examined international travel patterns in Japan using 2012 official tourism data produced by the JTA, and found that as the frequency of trips to Japan increases, international tourist flows shifted from golden routes to tourist circuits in regional areas. Each prefecture surrounding the metropolitan areas is more engaged in promotional activities aimed at foreign tourists, for example, encouraging them to use private lodging facilities called *minpaku*, to attract more international tourists in order to revitalise regional economies (Funck, 2016; MLIT, 2015b; The Japan Times, 2016c).

In 2015, the total contribution of Japan's travel and tourism to GDP was JPY 39,431.3 billion (USD326.1 billion), which represented 7.9% (WTTC, 2016a). It is forecast to increase by 1.7% per year to generate JPY 38,503 billion in 2026 (WTTC, 2016a).

Given the growth in inbound tourism, there has been a rising number of international visitors using accommodation facilities in Japan for overnight stays. As Table 1.7 illustrates, the total number of overnight visitors reached over 500 million in 2015, mainly due to overnight international visitor numbers which increased 46.4% from 2014 (Japan Tourism Agency [JTA], 2016a). The number of overnight international visitors in 2015 almost doubled the 2013 figure of 33.5 million (Table 1.7).

Table 1.7 Domestic and international overnight visitors in Japan

Year	Total overnight visitors	Domestic overnight visitors		International overnight visitors	
		million	Change (%)	million	Change (%)
2011	417.2	398.8	-[2]	18.4	-[2]
2012	439.5	413.2	3.6	25.3	37.5
2013	465.9	432.4	4.6	33.5	32.4
2014	473.5	428.7	-0.86	44.8	33.7
2015	504.1	438.5	2.3	65.6	46.4
2016[1]	494.2	423.3	-3.5	70.9	8

Source: JTA (2016a, 2017)

Note
[1]Provisional figures
[2] Due to an inclusion of accommodation establishments with less than nine employees in accommodation statistics since April 2010, changes in overnight visitors from 2010 to 2011 are not calculated.

City hotels are the most popular type of accommodation establishment used by international guests (MLIT, 2015b). International tourist numbers staying overnight in the city hotels significantly increased from 13.8% in 2011 to 30.8% in 2015, with reaching nearly 80% of an occupancy rate in some prefectures including Tokyo and Kyoto, followed by resort hotels, business hotels, and ryokan (JTA, 2016a; MLIT, 2015b). Ryokan are a small-sized traditional Japanese inn which is regarded as a form of the nation's unique cultural service-offerings (Lee & Lim, 2013; UNWTO & Korea Culture & Tourism Institute [KCTI], 2016) (Figure 1.1). The origin of ryokan dates back to the 17th century and developed today's accommodation business structure as a small private enterprise in the 18th century when rapid growth in travel emerged (Yamaguhi, 2011).

Figure 1.1: Examples of Japanese ryokan

Source: Hiiragiya Ryokan, Kyoto. Retrieved from https://jremembrance.wordpress.com/2014/07/25/ryokan-experience-2/ Photograph is in the public domain.

As described previously, a diverse range of accommodation is available in regions, with non-hotel types being a dominant player in the accommodation sector (Warren & Becken, 2017). In the case of Japan, according to the Ministry of Health, Labour and Welfare (MHLW) (2015) data, hotels only represent 12.6% and ryokan and lodges comprise a substantial portion of the total numbers of accommodation establishments, accounting for 53.6% and 33.7%, respectively. However, there is a lack of tourism studies on ryokan, particularly those written in English (Jimura, 2011), even though such traditional cultural accommodation establishments are important in the Japanese context.

1.6 Climate Change and Tourism in Japan

Japan is the sixth largest GHG emitter with a share of 3.6% of global CO_2 emissions, which corresponds to a production of 1.265 billion tonnes of CO_2 in 2014 (Greenhouse Gas Inventory Office of Japan [GIO], 2016; PBL Netherlands Environmental Assessment Agency, 2015). The upward trend of Japan's CO_2 emissions in the 2011-2013 period was mainly due to the serious

damage to the Fukushima nuclear plant as a result of the 2011 Japanese tsunami (Ministry of the Environment [MoE], 2015). The nationwide suspension of nuclear power plants led to an immediate increase in reliance on imported coal and liquefied natural gas (LNG) for thermal power generation, as a replacement of energy sources with nuclear power (Agency for Natural Resource and Energy, 2016a; MoE, 2015). As a result, in 2013, fossil fuels comprised more than 86% of the total power generation mix, up from 60% in 2010 (U.S. Energy Information Administration [EIA], 2015). In terms of the sectoral share of energy consumption, hospitality industries including accommodation are the second largest group of energy users in the service sector, accounting for 14.4% of the total energy consumed within the service sector (Agency for Natural Resource and Energy, 2016b).

In relation to climate change, according to the Japan Methodological Agency (JMA, 2016), the country's annual mean surface temperature has increased approximately 1.16°C between 1898 and 2015. The record of observed significant high temperatures was also concentrated from the 1990s onwards (JMA, 2016). Along with overall average temperature increases, several impacts of climate change have already appeared in Japan including sea-level rise and more intense and frequent heavy rains, typhoons, and hot days with the maximum temperature of 35°C or higher (JMA, 2016; MoE, 2016b). Increased urbanisation has also exacerbated temperature rises to create significant heat-island effects in cities, including Sapporo, Tokyo, and Kyoto (JMA, 2016; MoE, 2016b; Shimoda, 2003)

Increasing risks to biodiversity have also been observed, such as coral bleaching as a result of the rising sea surface temperature and increased acidity; 0.9 days earlier flowering of cherry blossoms per decade; and the later colouring of acer (maple) leaves at a rate of three days per decade (JMA, 2016; MoE, 2016b). Because cherry blossoms and acer leaves are regarded as Japanese important seasonal and cultural icons, as well as an integral part of the landscape, an increased concern is being expressed that the attractiveness of these tourism resources might be lost and lead to a decrease in the number of visitors to Japanese seasonal cultural events, such as the cherry blossom festival (Inoue & Nagai, 2015; Sakurai et al., 2011; Tsukahara & Hayashi, 2012).

1.7 Research Gaps in Climate Change and Accommodation in Japan

Alongside the limited availability of tourism-related information in English (Henderson, 2017), there has been very little coverage of the Japanese tourism industry in the English-language literature (Funck & Cooper, 2013), and to an even lesser extent in the climate change and tourism literature, yet because of the importance of tourism to the Japanese economy this is clearly an extremely salient topic. UNWTO et al. (2008) state that there is very little knowledge with respect to tourism-specific climate change in Japan. A similar situation also exists in the Japanese-language literature that few studies on tourism and climate change have been undertaken, while the greater emphasis has been given to the field of phenological studies, which seeks to identify observed shifts in the distribution of species, flowering, and leaf budding and colouring (Ogawa-Onishi & Berry, 2013). As Kunori and Kobayashi (2007) argue, there is a need for Japan's tourism to focus on political and business responses to climate change for the sustainability of Japanese tourism. The uniqueness of the present research is an integration of knowledge identified in the English and Japanese language literature, which has not yet been comprehensively examined by other scholars. As Becken (2013a) stresses, integrating English and non-English knowledge will lead to the further expansion of the field and the development of an improved network of tourism and climate change research.

1.8 Research Aims

The aim of this thesis is to investigate current state of mitigation and adaptation measures by Japanese accommodation providers in response to climate change. Further sub-objectives include:

- Identify any differences of climate change responses between accommodation categories
- Identify any differences of climate change responses between regions

1.8.1 Outline of Thesis

This thesis is divided into six chapters. This chapter provides an introduction to some of rising issues surrounding the tourism and climate change relationship in the world, Asia, and Japan, before moving on to discussing accommodation businesses and climate change in detail. The

development and the major knowledge gaps which exist in the field of both international and Japanese tourism research are also addressed to provide a justification for the chosen topic. Chapter 2 reviews available literature to provide a discussion on how accommodation establishments contribute to climate change, followed by outlining attributes of accommodation providers to respond to climate change. The method used to achieve the research aims is detailed in Chapter 3. In chapter 4 a content analysis is conducted of accommodation providers in Kyoto Prefecture and units of analysis include their corporate websites, blogs, and CSR reports. Finally, the thesis concludes with a discussion of the results in Chapter 5 and managerial implications and suggestions for future research are put forward in Chapter 6.

1.9 Summary and Conclusions

This introductory chapter has underlined some of the most crucial dimensions and trends of climate change from the global to the national scale. A two-way relationship between climate change and tourism also shows that the expected growth in emissions from tourism has exerted substantial pressure on tourism businesses to respond to climate change, especially for those sub-sectors which are the largest causes to emissions from tourism, as well as having a significant growth. This topic is particularly salient in Asian and Japanese tourism, given that the tourism industry is an important contributor to climate change, as well as its economic significance at a global and destination level and the growth of tourism capacity and emissions.

Chapter 2: Literature Review

2.1 Introduction

This literature review outlines how accommodation establishments contribute to GHG emissions. Two key dimensions, energy and water consumption, are examined at the global and the national scale for understanding factors that influence consumption. Building on this fundamental discussion of the contribution of accommodation to climate change, the chapter develops an identification of emission reduction potentials by looking at a variety of mitigation and adaptation measures which accommodation providers can take. The level of Implementation of each measure by global accommodation providers is also examined

2.2 Accommodation as a Tourism Emissions Sub-sector

2.2.1 Energy Consumption in Accommodation

As described in the previous chapter, accommodation establishments are the third largest emissions sub-sector of tourism. Among the non-residential building sectors, accommodation establishments are considered as the highest energy-intensive types of building (Dascalaki & Balaras, 2004). Energy use in accommodation facilities is usually due to cooking in restaurants and heating and cooling such as lighting, hot water provision, cooling for fridges and freezers, and air conditioning (A/C) (UNWTO et al., 2008). These contributions are all associated with operational practices in accommodation. From a building life cycle perspective, the operating phase of hotels in the Balearic Islands over their life time represents 70-80% of total energy use (Rosselló-Batle, Moià, Cladera & Martínez, 2010). Table 2.1 presents an estimate of global average values for energy use and emissions by accommodation category.

Table 2.1 Estimated global average energy use and emissions by accommodation type

Accommodation type	Energy use per guest night (MJ)	Emissions per guest night (kg CO_2)
Hotels	130	20.6
Self-catering	120	19.0
Vacation homes	100	15.9
Holiday villages	90	14.3
Campsites	50	7.9
Pensions	25	4.0
Estimated average	98	15.6

Source: Gössling (2002)

As shown in Table 2.1, hotels use more energy per guest and have greater CO_2 emissions than other types of accommodation (Gössling, 2002). Becken, Frampton and Simmons (2001) reach a similar conclusion in their study of New Zealand hotels as the largest energy users among accommodation categories, in terms of both total annual and per guest night energy uses. In general, the more luxurious the accommodation, the more energy will be consumed per guest night (Gössling, 2011). Indeed, in examining energy performance of different standard hotels in Taiwan, Wang (2012) found an average energy use value of 223MJ/guest night in international tourist hotels, indicating the highest energy use followed by standard tourist hotels (196MJ/guest night). Further analysis of emission values in Taiwanese hotels was conducted by Tsai et al. (2014), who found the highest average CO_2 emissions in international tourist hotels (28.9 kg CO_2/guest night). This is due to heating and A/C requirements for a greater room space and offering a wider range of energy-intense operational features in facilities, such as electrical appliances installed in guest rooms, bars, restaurants, swimming pools and spas, and on-site laundries (Becken, 2005; Becken & Hay, 2007; Bohdanowicz & Martinac, 2007; Gössling, 2002, 2011; Tsai et al., 2014; Wang, 2012). The study by Wang and Huang (2013) revealed a higher energy use per guest night in hotels provided with an on-site swimming pool (222MJ) and laundry facility (253MJ) than those without a swimming pool (148MJ) and laundry facility (150MJ). Indeed, water use is a major source of energy consumption and GHG emissions in tourism (Gössling et al., 2012; Gössling, Hall & Scott, 2015).

Table 2.2 provides the statistical summary of the results from existing empirical studies on energy use and emissions in global accommodation. As Gössling (2011) notes, due to the absence of a systematic approach to assessing energy use and emissions in global accommodation, comparison analysis remains difficult. Furthermore, a recent systematic review by Warren and Becken (2017) shows that limited comparison studies have been done on energy use by different types of accommodation, with a general lack of data on energy use in non-hotel types of accommodation. As described at the beginning of this chapter, a diverse range of global accommodation may explain the limited studies on energy use and emissions (Becken & Hay, 2007).

Table 2.2 shows that energy-use and emission values per guest night substantially vary with a wide range of physical and operational parameters, including the sources and amount of energy requirements; occupancy rate; geographical and climate location of accommodation; season, service quality; and water and resource consumption, as well as the amount of waste generated (Bohdanowicz & Martinac, 2007; Deng & Burnett, 2002a; Gössling, 2011; Önut & Soner, 2006; Sudou et al., 1999; Tsai et al., 2014; Trung & Kumar, 2005; Wang, 2012). No clear relationship of energy intensity with hotel class and occupancy level was, however, identified by Deng and Burnett's (2000) study of energy performance in Hong Kong's hotels. A similar result with respect to occupancy rate was found by Sasayama (2014) who identified no relationship between occupancy rate and the amount of CO_2 emissions generated by energy use in Japanese hot-spring ryokan. Furthermore, a weak or no statistically significant relationship between property age and energy performance has appeared in several studies (Bohdanowicz & Martinac, 2007; Coles, Dinan & Warren, 2016a; Deng & Burnett, 2000; Lai, 2016; Priyadarsini et al., 2009).

Table 2.2 Energy use and emissions in accommodation

Region/Country	Accommodation type	MJ/guest night[1]	Emissions per guest night (kg CO_2)	Energy source	Source
Queensland, Australia	Caravan parks	22-43 (mean: 32)		Electricity/Gas	Warnken et al. (2005)
	Eco-resort hotel	68-256 (mean: 165)			
	Hotel	110-265 (mean: 191)			
New Zealand	Campground	25	1.4	Electricity/Fossil fuels/Wood	Becken et al. (2001); Becken & Hay (2007)
	Motel	32	1.4		
	Hostel	39	1.6		
	B&B	110	4.1		
	Hotel	155	7.9		
	Holiday park	11-68			Becken (2013b)
	Backpacker	108			
	B&B	94-234			
	Hotel	187-551 (mean:385)			
	Luxury villas	1,753			
Hainan Province, China	4- and 5-star hotel	5-101 (mean: 32)		Electricity/Gas/Diesel	Lu et al. (2013)
Zanzibar, Tanzania	1- or 2-star hotel	205	14.5	Diesel generator	Gössling (2000), cited in Gössling (2011)
	4-star hotel	1,050	73	Diesel generator	
	3-star hotel	3.5	<0.1	Electricity (solar)	Gössling (2011)
Seychelles	5-star hotel	1,787	125	Diesel generator	Gössling (2007), cited in Gössling (2011)
Japan	Hotel	-	7.5	Electricity/Gas	Tamari et al. (2011)
	Hot-spring hotel	-	27.4	Electricity/Fossil fuels/Gas	Nakano et al. (2012)
	Hot-spring ryokan	108-144 (mean: 134)	A	Electricity	

		193-290		Diesel	
Greece	Hotel	29-339		Electricity/Fossil fuels	Karagiorgas et al. (2007)
Egypt	Total average	92 (+77 diesel)		Electricity/Diesel	Ragab & Meis (2016)
	Under-classified hotel	15 (+12 diesel)			
	2-star hotel	90 (+39 diesel)			
	3-star hotel	108 (+70 diesel)			
	4-star hotel	138 (+70 diesel)			
	5-star hotel	130 (+100 diesel)			
Sicily, Italy	Total average	65 (+50 thermal)	9.2	Electricity only	Beccali et al. (2009)
	1- or 2-star hotel	32 (+50 thermal)	4.7		
	3-star hotel	50 (+50 thermal)	7.1		
	4- or 5-star hotel	112 (+50 thermal)	15.8		
Europe	Campground	59.4		Electricity/Gas/Oil	Hamele & Eckardt (2006)
	B&B	208		Electricity/Gas	
	2-star hotel	347			
	3-star hotel	311			
	4-star hotel	280			
	5-star hotel	269			
Taiwan	Homestay facilities	N/A	6.3	Electricity/Fossil fuels/Gas	Tsai et al. (2014)
	General hotel	N/A	12.5		
	Standard tourist hotel	83-408	19.2		Tsai et al. (2014); Wang & Huang (2013)

	International tourist hotel		28.9		
	4-and 5-star hotel		29	Electricity/Gas/Oil	Huang et al. (2015)
Hong Kong	Hotel	23-7 (mean: 11)		Electricity only	Burnett (1994), cited in Jim (2000)
Cyprus	Hotel	87		Electricity/Gas/Oil	Simmons & Lewis (2001), cited in Gossling (2011)
Majorca	Hotel	51		Electricity/Gas/Oil	Simmons & Lewis (2001), cited in Gossling (2011)
Germany	Hotel	200			Brunotte (1993)
	Holiday village	91		Electricity only	Luthje & Lindstadt (1994), cited in Gossling (2011)
England	Self-catering heritage accommodation	86.4 216 68.4		Electricity/Gas/Wood Electricity/Gas/Wood/Solar thermal Electricity/Wood	Coles et al. (2016a)
	Small- and medium-sized accommodation	14-356		Electricity/Fossil Fuels/Wood	Coles et al. (2016b)
Fiji[2]	Budget	61	4	Electricity/Fossil fuels	Becken (2005)
	Motel and Hotel	40	2		
	Resort hotel	443	27		

Note: Adapted from Gössling (2011) and Warren and Becken (2017)

[1]Based on conversion factors: 1kWh = 3.6 MJ; 1MJ = 0.28 kWh; 1 L diesel = 2.7 kgCO_2; 1 L diesel = 38.6 MJ
[2]Based on a conversion factor of 1 L diesel = 38.1 MJ; 1 L LPG = 26.5 M

Electricity is typically the main energy source used in operating A/C, laundry services, lighting, and fridges, while fuels are used for cooking and water heating (Tang et al., 2016; UNWTO et al., 2008). For example, Becken et al. (2001) identified that electricity makes up 75% of the total energy sources used in New Zealand accommodation establishments, followed by coal (12%) and liquefied petroleum gas (LPG) (9%). Similar values of electricity as the dominant share of energy source for accommodation was found in other studies in Europe (Bohdanowicz & Martinac, 2007); Greece (Karagiorgas, Tsoutsos & Moiá-Pol, 2007); Spain (Rosselló-Batle et al., 2010); South Africa (Machete, Nhamo & Rampedi, 2016); Hong Kong (Deng & Burnett, 2000; Lai, 2016), Vietnam (Trung & Kumar, 2005); Singapore (Priyadarsini, Xuchao & Eang, 2009; Xuchao, Priyadarsini & Eang, 2010); Sri Lanka (Udawatta, Perera & Witharana, 2010); Taiwan (Huang et al., 2015; Tsai et al., 2014; Wang, 2012); China (Tang et al., 2016); and Japan (Nakano et al., 2012; Sudou et al., 1999). A different energy mix composition was found in a survey conducted by Zmeureanu et al. (1994) in which steam accounted for about 45% of total energy use in hotels in Ottawa, Canada, followed by electricity (29%) and gas (26%). Hotels in the northeastern United States (US) were also found to have an energy mix of gas (46.2%), electricity (39.2%), and gas and steam (14.6%) (Zmeureanu et al., 1994). Clearly the energy mix will vary according to local energy supply factors.

In terms of the purposes of energy use, space conditioning including heating, ventilating and air conditioning (HVAC) is generally the largest single energy end use demanding significant amounts of electricity in accommodation (Huang et al., 2015). A/C electricity use appears to be dominant in Asian accommodation establishments, and Su and Hall (2014) note that in most cases, Asian three- to five-star hotels have higher levels of energy consumption than European hotels due to the extensive use of A/C. For example, HVAC systems are commonly used in Hong Kong's hotels (Chan, Okumus & Chan, 2017), and A/C accounted for one-third (32%) of the total energy consumption, the remainder being used for lighting (12%), lifts and escalators (5%), other electrical systems and appliances (23%), and cooking and water heating (28%) (Deng & Burnett, 2000). Taiwanese hotels were found to use 40-50% of total energy use for A/C (Huang et al., 2015; Tsai et al., 2014). A significant share of electricity consumption for A/C in accommodation also appears in Japan, Vietnam, and Shenzhen, China representing 60%, 46-53%, and 43%, respectively (Trung & Kumar, 2005; Sudou et al., 1999; Guo, Li & Yang, cited in Lu et al., 2013).

Iwabuchi et al. (2004) assessed how electricity demand in Japanese business hotel rooms changes with respect to different electrical appliances, hourly use, and whether rooms were occupied by guests or not. They found that on average, 56% of total energy was used for A/C in occupied rooms, whereas in unoccupied rooms, refrigerators accounted for about half (51%) of total energy use (Table 2.3). Their results demonstrate that, regardless of whether the room is occupied or not, energy is consumed during the 24-hours operations of accommodation businesses all year around (Hotel Energy Solution, 2011). Electricity consumption in occupied rooms is significantly higher compared to unoccupied rooms, and the operation of A/C systems in occupied rooms were observed throughout the check-in and check-out time, which peaked at 11:00 pm and 7:00 am (Iwabuchi et al., 2004). A/C is switched on even in unoccupied rooms and it is also observed in tropical and humid destinations, especially for upscale hotels, whose high service quality is required to ensure comfort as well as inhibiting mould growth and undesirable smells (Becken & Hay, 2007; Priyadarsini et al., 2009). In several empirical studies (Ali et al., 2008; Huang et al., 2015; Önut & Soner, 2006; Tsai et al., 2014; Zografakis et al., 2011), the summer season has been found to be the peak electricity usage for A/C, as a result of increased A/C requirements.

A different factor taking up the greatest portion of electricity end use other than A/C was found in four and five star hotels in Sicily, where lighting contributed an equal share (35%) of electricity consumption with heating, ventilating and air conditioning (HVAC), followed by cooking and food and refrigeration (15%), hotel services (19%) and losses (5%) (Beccali et al., 2009). HVAC and lighting were also found to have high energy-consumption values in Jordanian hotels (Ali et al., 2008). A recent study of energy use in guesthouses in Mpumalanga of South Africa by Machete et al. (2016) shows that 87.5% of energy is used for indoor lighting, water heating, and indoor thermal control.

Table 2.3 Average electric energy use in Japanese business hotel rooms by electrical appliance

Electrical appliance	Occupied guest room (%)	Electricity use per guest night (MJ)	Unoccupied guest room (%)	Electricity use per guest night (MJ)
A/C	56	11	9	0.37
Refrigerators	12	2.1	51	2
TV	8	1.4	14	0.58
Table lamps	1	0.25	0	0
Kettle	1	0.22	0	0
Others	22[1]	3.96	26[2]	1.06
Total	100	**19**	100	**4**

Note: Adapted from Iwabuchi et al. (2004)

[1]Others influencing electrical demand for occupied rooms include ventilation, lighting in bathrooms and guest rooms, hair dryer, and electronic device charger.
[2]Others influencing electrical demand for vacant rooms include lighting during cleaning the room and ventilation in bathrooms.
Based on a convention factor of 1kWh = 3.6 MJ, and the study was conducted in the winter season.

2.2.2 Water Consumption in Accommodation

Water use is closely interrelated with energy use as energy is required for water production including pumping and transport, and water is needed for energy production, such as thermoelectric cooling and hydropower (Rutty, Gössling, Scott & Hall, 2015). In a recent review by Gössling (2015b), it has been indicated that the volume of direct water consumed by accommodation ranges from 84 to 2425 litres (L) per tourist per day and it includes water use in guest rooms and irrigation of swimming pools and gardens (Gössling, 2015b).

Significantly higher water volumes consumed by higher standard accommodation establishments have been found in previous empirical studies (Deng & Burnett, 2002b; Hamele & Eckardt, 2006; Ragab & Meis, 2016; Tortella & Tirado, 2011; Trung & Kumar, 2005). Those with on-site water-intensive facilities, such as multiple and large pools and landscaped grounds including golf courses, typically require considerable irrigation, resulting in higher water consumption (Bohdanowicz & Martinac, 2007). For example, Gössling's (2001) study of hotels and guesthouses in a tropical destination, Tanzania, indicates that continuous irrigation of gardens made up half of total water consumption in hotels, with a weighted average of 465L per tourist per day, while irrigation in guesthouses represent only 15% of total water use. Swimming pools are regarded as another

major factor of water consuming in hotels, representing approximately 15% of water demand (Gössling, 2001). A similar result was identified by Antakyali, Krampe and Steinmetz's (2008) study of water consumption in the Iberotel Sarigeme Park resort hotel which found that approximately 20%-25% of total water was utilised in swimming pools. Gössling (2001) points out that higher water demand of high standard hotels is attributed to swimming pools, which trigger additional water use in taking showers and add to indirect water use for laundry, due to handing out additional towels to guests for swimming.

A study of hotels in Australia shows that guest rooms (42%) were identified as the dominant areas of water usage, followed by kitchens (16%), laundry (15%), public toilets (12%), cooling towers (10%), irrigation (3%), and swimming pools (2%) (Smith, Hargroves, Desha & Stasinopoulos, 2009). Similar values are presented by Trung and Kumar (2005), except in resort hotels, where outdoor activities have the largest share of water use. In contrast, a larger proportion of water use in guest rooms is found in guesthouses in Tanzania (55%) than hotels (20%), but in absolute terms, the volume of water usage in hotels (186L per tourist per day) is higher than guesthouses (136L per tourist per day) (Gössling, 2001). As Gössling (2015b) notes, there is a general lack of data on disaggregated water end use including gardens, guest rooms, and pools. Two independent analyses (Iwabuchi, Murakami & Kasahara, 2003; Tanaka, Murakawa & Takada, 2007) have been conducted to examine the volume of room-related water use in Japanese hotels. Iwabuchi et al. (2003) measured water volumes of three factors on an end use basis in Japanese business hotel rooms and these included water, hot water, and flushing a toilet (Table 2.4).

Table 2.4 Average volume of water use per tourist per day in Japanese business hotels

Water end use	Water use per tourist per day (L)[1]	%	Water use per tourist per day (L) for cleaning rooms
Cold water	120	49	6.9
Hot water	106	28	7.4
Flushing a toilet	55	23	15.4
Total	**281**	100	**29.7**

Note: Adapted from Iwabuchi et al. (2003)

[1]The volume of water consumed for cleaning rooms is included in calculations for water end-use factors.

As shown in Table 2.4, cold water represents the major factor of water use in guest rooms with accounting for nearly half (49%) of the water demand, and the total consumption of cold water usage including flushing a toilet accounted for 72% of water use (Iwabuchi et al., 2003). The total volume of water use in Japanese business hotel rooms is relatively high compared to Gössling's (2001) study which showed 186 L per tourist per day was consumed for direct water uses including taking showers, flushing a toilet, and the use of tap water. Iwabuchi et al. (2003) concluded the need for longitudinal data collection of water usage in accommodation to increase reliability. A year-long analysis was developed by Tanaka et al. (2007) to measure water use of these three end-use factors in guest rooms of a city hotel in Kyoto. No significant differences in the average water use were found with respect to the seasons, days of the week, and the number and sex of visitors who stayed in rooms (Tanaka et al., 2007). Table 2.5 illustrates the average water use values in city hotel rooms by seasons, and the highest hot water volumes were used in the winter season, while the highest cold water use in the summer season.

Table 2.5 Average volume of water use in Japanese city hotel rooms per L per day

	Hot water	Cold water	Flushing a toilet	Total
Summer season	319.4	202.4	150.9	672.7
Middle season[1]	356.7	193.2	169.3	719.2
Winter season	382.2	184.3	162.6	729.1
Total	355	192.7	161.3	709

Note: Adapted from Tanaka et al. (2007)
[1]Assumes middle season includes April, May, October and November.

2.3 Accommodation Responses to Climate Change

Changes in environmental behaviour in all stakeholders are crucial to achieve the sustainability of tourism futures (Hall, 2014c; Truong & Hall, 2015), particularly when it is recognised that the majority of environmental issues facing the world are primarily due to human behaviour (McKenzie-Mohr, 2000; Oskamp, 2000; Takahashi, 2009). Yet, the understanding of the sustainability of behaviours and practices of tourism stakeholders in accommodation including guests, owners and managers remains unknown, due to the lack of longitudinal studies (Hall et al., 2016).

2.3.1 Energy Conservation Measures

The key conservation measure in accommodation establishments is to reduce energy consumption (Gössling, 2011), and a wide range of options are available to reduce energy use, which usually offer economic benefits as well (UNWTO et al., 2008; WEF, 2009). In a study identifying energy savings potential in New Zealand accommodation, Becken (2013b) found that a variety of energy savings measures could be implemented without any capital investment requirements. The energy saving potential is especially significant when energy consumption constitutes a large part of operational expenses due to "unnecessary loss and wastage" (Hotel Energy Solutions, 2011, p. 5).

Energy reduction starts with the construction phase of new accommodation buildings which have the potential to reduce energy-related emissions (Lucon et al., 2014; Scott et al., 2012). Recent developments in technology, design practices and behavioural changes can achieve 50-90% of energy savings in new buildings and 50-75% in existing buildings (Lucon et al., 2014). Building design, which includes insulation, glazing, natural ventilation, the right positioning of electrical appliance installations such as A/C, and optimisation of daylight, can provide a significant precondition for the maintenance of optimal room temperatures and a considerable reduction of overall energy use in accommodation buildings (Ali et al., 2008; Coles & Zschiegner, 2011; Önüt & Soner, 2006; Nelson, 2010; UNWTO et al., 2008; Zeppel & Beaumont, 2014; Zografakis et al., 2011). A recent simulation study of hotel buildings in Greece conducted by Farrou, Kolokotroni and Santamouris (2016) reveals that the 'switch off and absorb' principle which refers to the use of external shading and glazing with adding wall and loft insulation is the optimal refurbishment

strategy for all-year operated hotel businesses as well as a mitigation measure to respond to climate change. Table 2.3 provides the implementation level of accommodation providers' energy-efficient building design practices which was identified by previous studies in the context of different countries.

Table 2.3 Implementation levels of energy-efficient building design in accommodation

Region/Country	Sample size	Energy-efficiency building design	Natural light/ventilation	Source
Jordan	66	10%	14%	Niga et al. (2002)
	70		61%	Kyoto GPN (2010)
Kyoto, Japan	80		93.2%	Ali et al. (2008)
	80	8.8%	95%	Ali et al. (2014)
Croatia	200	30%		Peršić-Živadinov & Blažević (2010)
England	52 (Lake District)	80%		Leslie (2007)
	417 (south-west England)	>31.4%		Coles & Zschiegner (2011)
New Zealand	242	6.6%		Becken (2013b)
Taiwan	45	2.38[1]		Su et al. (2013)

Note: [1]Based on a five-scale point of 1 = "low implementation level", 3 = "moderate implementation level", 5 = "high implementation level".

Along with the application of design practices, natural materials can be also used as building materials for accommodation to make a potential contribution to climate change mitigation (Nakajima, Yamada, Nakamura & Ikeda, 2009). For example, empirical findings show that when natural hydraulic lime (NHL) is used as building materials for plastering walls, it can adjust room temperatures at optimal levels, as well as enhancing air quality (Nakajima et al., 2009). Indeed, the use of such natural resources which have been used mainly for traditional architecture in Japan is included in the guidance on energy-efficient buildings in Kyoto City (Kyoto City, n.d.).

For existing accommodation establishments, energy efficiency and the reduction of energy use have been identified by previous research as the most commonly adopted measures (Becken, 2013b; Bohdanowicz, 2006; Chan et al., 2017; Jenkins & Nicholls, 2010; Hobson & Essex, 2001; Mensah, 2006; Nelson, 2010; Petrevska, Cingoski & Serafimova, 2016; Wan, 2007; Zeppel &

Beaumont, 2014). Energy efficiency involves technological measures such as installation of energy-efficient light bulbs, including light emitting diodes (LED) lighting, and switching off appliances, including timer and occupancy sensors and room-key or card systems used as an entrance key to shut down energy use in rooms when not occupied (Ali et al., 2008; Becken, 2005; 2013b). Chan et al.'s (2017) study shows that the most popular environmental technologies used in Hong Kong's hotels are directed to reducing electricity consumption, which is a main factor of energy use in accommodation operations. Table 2.4 provides implementation levels of each energy efficiency measure by global accommodation establishments. Such measures have shorter payback periods (Becken 2013b; Chedwal, Mathur, Agarwal & Dhaka, 2015; Scott et al., 2012). For example, Dascalaki and Balaras (2004) reported that the estimated payback time of installing a room key-card control in hotel rooms is 1.5 years. The current advances in LED lighting technology provide a better lighting performance and longer lifetimes with low power consumption, compared to conventional lighting such as incandescent lamps (Aman, Jasmon, Mokhlis & Bakar, 2013). A drastic decrease in the market price of LED lighting can facilitate renovation strategies to replace old lighting with more energy efficient lighting systems in accommodation facilities (Huang et al., 2015). As a consequence, a considerable amount of energy use can be reduced, potentially up to 20% for heating, 30% for cooling, 60% for lighting, and 70% for hot water supply (Hotel Energy Solutions, 2011).

Iwabuchi et al. (2004) point out the importance of accommodation providers taking into consideration the reduction of energy use in unoccupied guest rooms, as their empirical study findings demonstrate the energy consumption of electrical appliances in unoccupied hotel rooms. A more controversial, yet practically feasible, approach is to phase out electrical appliances from guest rooms (Gössling, 2011). The majority of guests (90%) reported positive reactions to upscale hotels' removal of in-room appliances including mini-bars and television (TV) sets (Gössling, 2011).

Another important aspect of energy conservation is to reduce electricity demand for A/C. As previously noted, A/C is the major energy-consuming factor in accommodation, thus reducing its electricity use is a key measure in terms of contributing to climate change mitigation while simultaneously reducing operational costs (Gössling, 2011; Huang et al., 2015). Adjusting room temperatures at optimal levels according to the season is one of the most important management

measures (Scott et al., 2012), and UNWTO et al. (2008) suggest room temperature to be ideally between 20-25°C. Accommodation establishments are centrally air-conditioned in public spaces, such as lobbies and restaurants, while A/C units are individually equipped in each guest room (Zografakis et al., 2011). Guests are usually given full control over thermostat settings of temperature of A/C units and have a propensity to adjust them with little or no concern for energy savings (Hotel Energy Solution, 2011). This is associated with the study findings of tourists' behaviour in two different consumption settings in the context of the UK by Barr, Shaw and Coles (2011) that consumers with moderate to high levels of commitment to environmental activities at home fail to convey these activities to holiday destinations The reduction of energy use in A/C can be facilitated through technical options, such as the introduction of control units and digital measurement, for instance, that shuts down A/C systems when balcony doors or windows are opened or cool or heat rooms for an only short time period before they are actually used (Gössling, 2011). A simulation study of energy performance in luxury hotels in the United Arab Emirates conducted by AlFaris, Abu-Hijleh and Abdul-Ameer (2016) shows that 43.2% energy savings for cooling can be achieved by thermostats combined with an integrated control system to reset the room temperature to 29°C during times in unoccupied rooms.

A replacement of existing or outdated space-conditioning systems with high-efficiency ones is another technical option for reducing electricity use (Ali et al., 2008). Bohdanowicz (2006) reports that Swedish and Polish hotels commonly adopted replacing/modifying existing space conditioning as part of energy-efficiency measures. With regard to energy efficiency improvements of space-conditioning units, it is crucial to have a frequent or annual maintenance of heating, cooling and refrigeration equipment, as well as self-cleaning of A/C filters or coils (Önut & Soner, 2006; Niga et al., 2002; Nikolaou et al., 2012; UNWTO et al., 2008; Zografakis et al., 2011).

The primary motivation for accommodation providers' commitment to energy efficiency strategies is reducing operating costs rather than environmental consideration because energy consumption is typically the major cost factor in their operation (Becken, 2005; Hobson & Essex, 2001). In a survey of hotels in Japan, Tanaka (1999) found that lighting and A/C systems were rated as a high priority for energy-saving measures and he concluded that this might be attributed to high operating costs of these electricity facilities.

2.3.2 Energy Improvement Measures

While the mitigation measures which are mentioned above can achieve potential reductions in energy use without great capital investments, Eras et al. (2016) point out that further improvements in energy efficiency would require technology upgrade which often involves capital investments. Renewable energy (RE) sources are one of the core measures to reduce fossil energy usage and reach sustainability (Ali et al., 2008). Previous studies have concluded that RE installations for small to medium-sized accommodation establishments are technically feasible and economically viable (Aagreh & Al-Ghzawi, 2013; Bakos & Soursos, 2002; Dalton, Lockington & Baldock, 2009; Fazelpour, Soltani & Rose, 2014). For example, photovoltaic cell (PV) installations for small-sized tourist operations in Greece are economically viable, with up to 10 years of a payback period and significantly lower payback periods if the government's subsidy constitutes a larger portion of PV installations (Bakos & Soursos, 2002). Zhen et al. (2016) also note that subsidy policy would have an influence on accommodation as economic incentives to facilitate the introduction of RE installations. This reflects hotel managers' opinions that the investment subsidy incentive is the most important driver to facilitate a faster penetration of energy efficient technologies including RE installations in the hotel industry (Zografakis et al., 2011).

Conversely, Dalton et al.'s (2009) case studies of small to medium-sized accommodation operations in Australia indicated that wind energy conversion system (WECS) is the most economically viable option for RE supply, which has lower payback periods (3-4 years) than PV installations whose payback periods are 6-7 years. A feasibility study of RE installations in the context of large-scale resort hotels in Australia conducted by Dalton et al. (2008) revealed similar findings with respect to the high potential use of WECS, and a larger-scale WECS with over 1000kW has more economical viability than multiple small-scale WECS. Recent research on a feasibility analysis of RE installations for a medium-scale hotel in Iran suggests the wind-diesel hybrid system with battery as the most preferable option for energy efficiency improvements as well as meeting the hotel's electricity demands (Fazelpour et al., 2014).

Although evidence demonstrates technical feasibility and values in marketing, such as image enhancement, of RES installations in accommodation (Dalton et al., 2007; Gössling & Schumacher, 2010; Scott et al., 2012), only a very limited number of accommodation establishments appears

to adopt RE installations (Hotel Energy Solution, 2011). As shown in Table 2.5, previous research has found low implementation levels of accommodation installing RE in their facility, with the exception of some accommodation establishments in Europe.

Table 2.4 Implementation levels of energy-saving measures in accommodation

Region / Country	Sample size	Use energy-saving light bulbs	Cleaning and maintaining A/C units	Turn off lights / electrical equipment when not in use	Use power control room key or card	Install energy control system	Source
England	64 (Plymouth)	67%					Hobson & Essex (2001)
	417				6.2%		Coles & Zschiegner (2011)
Kyoto, Japan	66	18%		47%	10%		Niga et al. (2002)
	70	69%		40%(fridge) 74% (kettle) 89% (A/C)	20%		Kyoto GPN (2010)
Accra, Turkey	52	94.2%					Mensah (2006)
Ankara, Turkey	30 (3 star hotel)				39.7%	29.1%	Erdogan & Baris (2007)
	17 (4 star hotel)				>80%		
	7 (5 star hotel)				57.2%	28.6%	
China	37 (Macau)	7.1%		3.20%		10.60%	Wan (2007)
	31 (Macau)	96.7%			70%	53.3%	Wan et al. (2017)
	23 (Hong Kong)	94.4%			72.2%	72.2%	Chan et al. (2017)
Jordan	80	8.5%		41.2%			Ali et al. (2008)
Greece	32 (Crete)		87.45% (once a year) 78.1% (once every six months) 43.8% (once every three months)		84.38%		Zografakis et al. (2011)
	91 (Corfu Island)	79%	86.1%		81%	31%	Nikolaou et al. (2012)
Mashhad, Iran	69	90%				60%	Aminian (2012)
USA	166	77.11%		75.3%			Rahman et al. (2012)
New Zealand	242	22.7%				>3.3%	Becken (2013b)
Taiwan	45		3.79[1]	2.98 (A/C)	3.53[1]	4.02[1]	Su et al. (2013)
Thailand	23	91%		22% (A/C)			Mishra (2016)

Note: Adapted from Su (2014).

Table 2.5: Implementation levels of RE installations in accommodation

Region / Country	Sample size	Install renewable energy sources and/or alternative fuels	Source
Cairns, Australia	52	11.5%	Curtis (2002)
Kyoto, Japan	66	3%	Niga et al. (2002)
	70	9% (RE sources) 43% (switch to alternative energy)	Kyoto GPN (2010)
Accra, Ghana	52	8%	Mensah (2006)
Ankara, Turkey	7 (5 star hotel)	0%	Erdogan & Baris (2007)
	17 (4 star hotel)	17.6%	
	30 (3 star hotel)	13%	
Queensland, Australia	108	9.2%	Dalton et al. (2007)
Australia	536	9%	McNamara & Gibson (2008)
Jordan	80	9.9%	Ali et al. (2008)
	80	10%	Ali et al. (2014)
USA	191	48%	Park (2009)
England	417	17.5% (green energy supplier) 10.3% (solar-powered heating) 9.1% (solar energy panels) 2.6% (wood chip boiler)	Coles & Zschiegner (2011)
	29	24.1%	Coles et al. (2015b)
Catalonia, Spain	394	30-45%	Garay & Font (2012)
Corfu Island, Greece	91	52%	Nikolaou et al. (2012)
Slovenia	63	4%	Lebe & Zupan (2012)
New Zealand	242	4.5% (solar) 6.9% (fuel switch)	Becken (2013b)
Taiwan	45	2.49	Su et al. (2013)
Europe	601	18%	Becken & Dolnicar (2016)
Mpumalanga, South Africa	8	12.5%	Machete et al. (2016)
Thailand	23	17%	Mishra (2016)
Macau	31	6.7%	Wan et al. (2017)

Note: Adapted from Su (2014)

2.3.3 Water Saving Measures

Water conservation can have two different forms of adaptation measures, which are demand-side strategies involving water-efficiency improvements and supply-side strategies associated with increasing water storage capacity (Bates, Kundzewicz, Wu & Palutikof, 2008). Given the larger share of water use in guest rooms, simple and cost-effective measures can be achieved without compromising guest comfort, such as replacing water-efficient fixtures including faucet flow restrictors, low-flow showerheads, and dual-flush or reduced flush toilets (Smith et al., 2009; UNWTO et al., 2008). Such measures have the potential to reduce 30% of indoor water use in accommodation (Cooley et al., 2007), and it has been suggested by Gossling et al. (2012) that reducing water consumption will generally be economical (see also Gössling et al., 2015).

Other demand-side measures include linen and towel reuse programmes as laundry is considered another significant factor of water consumption. With regard to supply-side strategies, rainwater and grey water can be used as alternative sources of water to increase water capacity. These water-saving measures including grey water reuse and rainwater collection have short payback periods from 0.1 to 9.6 years (Fortuny, Soler, Cánovas & Sánchez, 2008). Table 2.6 shows implementation levels of various water-saving measures by accommodation providers, and they reveal highly involved in water management, while some national accommodation providers are simultaneously less engaged in particular measures.

Table 2.6 Implementation levels of water saving measures in accommodation

Region / Country	Sample size	Adopt water saving measures	Towel and linen reuse	Use water-efficiency fixtures	waste water treatment	Adopt a grey water reuse system	Use rainwater storage	Source
Kyoto, Japan	66			>14%				Niga et al. (2002)
	70		39%	46%			14%	Kyoto GPN (2010)
Sweden	225	>67%	71.60%	61.8%				Bohdanowicz (2006)
Poland	124		64.5%	44.4%				
Turkey	54 (Ankara)		86.8%[1]		32.5%[1]			Erdogan & Baris (2007)
	73 (Central Anatolia)	0.81[2]	2.03[2]		0.41[2]			Erdogan & Tosun (2009)
Accra, Ghana	52	77.8%		67.3%				Mensah (2006)
Australia	536		56%	39%	11%		8%	McNamara & Gibson (2008)
China	37 (Macau)	77.8%		3.9%				Wan (2007)
	31 (Macau)		76.7%	76.7%	23.3%			Wan et al. (2017)
	28 (Hong Kong)			64%	3%			Chan et al. (2009)
	23 (Hong Kong)			>55.6%				Chan et al. (2017)
New Zealand	94		79%	73%				Ustad et al. (2010)
Crete, Greece	32				84.38%			Zografakis et al. (2011)
England	417		51.8%	>51.6%		7.9%		Coles & Zschiegner (2011)
Malaysia	60 (Klang Valley)		5.40[3]	>2.52[3]	2.73[3]			Kasimu et al. (2012)
Mashhad, Iran	69				40%			Aminian (2012)
USA	217 (Michigan)		88.2%	60.8%				Nicholls & Kang (2012)
	166		87%	64%				Rahman et al. (2012)
	172	5.07[4]						Kim et al. (2015)
Taiwan	45	3.38						Su et al. (2013)
Jordan	80	77.4%	>79.7%	>53.1%	33.4%			Ali et al. (2014)
Thailand	23		96%	>48%				Mishra (2016)

Note: Adapted from Su (2014).

[1]Calculation includes response values of 3-5 on a five-point scale ranging from none to very high levels of implementation.

[2]Based on a four-scale point ranging from 0 (no performance) to 4 (the highest level of performance)

[3]Based on a response value of a seven-point scale from 1 (strongly disagree) to 7 (strongly agree).

[4]Based on a seven-point scale of involvement in environmental practices from 1 (not at all) to 7 (a very great extent).

2.3.4 Green Purchasing

Green purchasing is associated with the use of local and seasonal food and beverages and environmentally friendly or eco-certified products, such as cleaning products (Table 2.7). Using locally produced food embodies potential values for creating an enhanced local or regional identity (Everett & Aitchison, 2008; Sims, 2010); contributing to local or regional economic development (Hall, 2004; Nummedal & Hall, 2006, Hall & Gössling, 2013, 2016); and more importantly, a potential reduction of GHG emissions associated with food production and transportation, as making a contribution to climate change mitigation (Gössling et al., 2011). Food miles represent the physical journey of food from its production to an end-use consumption and the transport distance can serve as a measure of its sustainability, due to that transporting food has an environmental impact including transport-related emissions (Garrod, 2015). In particular destinations such as small isolated islands, imported food entails considerable distance travelled (Gössling, 2011), and it has been suggested that local sourcing of foodstuffs can be more environmentally sustainable (Garrod, 2015). Yet, a life-cycle analysis of the food supply chain in the US by Weber and Matthews (2008) reveals only 11% of food-related GHG emissions associated with transportation as a whole, while food production accounts for 83% of total emissions. Tachibana et al. (2009) reached a similar conclusion that the transportation of foodstuffs comprises a very small share of the overall environmental impact of food consumption. Their findings suggest that 8% of energy use in transport can be reduced by locally producing and consuming food products and 0.2% by seasonal food production and consumption (Tachibana et al., 2009).

In preparing meals, some foodstuffs involve higher GHG emissions and meat is one of the most significant food categories in terms of the GHG intensity (Gössling, 2011; Gössling et al., 2011). The provision of reducing meat content and more vegetable dishes on the menu is a potential option for sustainable food management (Garrod, 2015; Gössling et al., 2011), as well as achieving more GHG reduction than purchasing locally produced food (Weber & Matthews, 2008).

Another consideration with respect to sustainable food management includes organic food production (Table 2.7). It is thought to have an emission reduction potential and enhance soil

carbon sequestration (Gattinger et al., 2012; Scialabba & Müller-Lindenlauf, 2010). Nevertheless, it remains unclear whether organic food production can lead to climate change mitigation, due to the inconsistent measurement of GHG emissions derived from organic food production in published empirical studies (Gössling et al., 2011). As shown in Table 2.7, roughly one third of the accommodation providers in Japan and Greece are using organic food products (Kyoto GPN, 2010; Nicholls & Kang, 2012), while more than half (55%) of Slovenian hotels doing so (Lebe & Zupan, 2012).

Table 2.7 Implementation levels of green purchasing in accommodation

Region / Country	Sample size	Use locally produced food	Use seasonal food	Purchase environmentally friendly products	Use organic / eco-certified food	Source
Plymouth, England	64	75%		52%	12.5%	Hobson & Essex (2001)
Kyoto, Japan	66	17%	36%	17%	17%	Niga et al. (2002)
	70	49%	70%	27%	24%	Kyoto GPN (2010)
Sweden	225			46%		Bohdanowicz (2006)
Poland	124			15.30%		
Ankara, Turkey	54	77.5%[1]		80%[1]		Erdogan & Baris (2007)
Catalonia, Spain	394	80%				Garay & Font (2012)
Michigan, USA	217			52.6%	29.7%	Nicholls & Kang (2012)
Mashhad, Iran	69			87%		Aminian (2012)
Slovenia	63				55%	Lebe & Zupan (2012)
Taiwan	45	3.9		3		Su et al. (2013)
Accra, Ghana	200	4.75[2]		4.09[2]		Mensah (2014)
Jordan	80			18.4%		Ali et al. (2014)
Thailand	23			87%		Mishra (2016)

Note: Adapted from Su (2014).

[1]Calculation includes a response of 3-5 on a five-point scale ranging from none to very high levels of implementation.

[2]Based on a six-point scale from 1 (never) to 6 (very frequently implemented).

2.3.5 Waste Management

The top three Rs of priority actions for waste management are reducing, recycling, and reusing materials (McKenzie-Mohr, Lee, Schultz & Kotler, 2012). Common practices of accommodation providers' waste management include waste sorting and/or recycling; removal of throw-away packaging such as amenities; compositing food leftovers; and reduce the use of materials, such as replacing soap containers with dispensers (Table 2.8). Notably, accommodation providers in the South West of England, New Zealand, and Spain, are actively engaged in waste management (Coles & Zschiegner, 2011; Garay & Font, 2012; Ustad et al., 2010), whilst accommodation providers in Turkey and Ghana have a low involvement in such practices (Erdogan & Baris, 2007; Mensah, 2006, 2014). It has been suggested that the availability of technical and financial resources and collaboration between accommodation industries, government agencies, and other industries such as recycling firms are inevitably needed for waste management practices (Erdogan & Baris, 2007; Mensah, 2006, 2014). In a study of hotel industries in Japan, Ueoka and Kanaya (2012) found that the hotels' collaboration with recycling firms for the collection of recyclable waste differed between locations. While 80% of the hotels in urban areas collaborate with recycling firms, only 43% of those located in regional areas have such a practice, and they appear to have their own recycling programmes, such as food composting, mainly due to a lower operating cost of doing so rather than their reliance on recycling firms (Ueoka & Kanaya, 2012).

Large and five star hotels have the best performance in waste management practices among other star categories of hotels (Erdogan & Baris, 2007). In contrast, a study by Nicholls and Kang (2012) shows that small and medium-sized accommodation providers are more likely than large ones to adopt waste sorting and recycling or food leftover donations. This supports the finding of a similar study by Kyoto GPN (2010) that ryokan has a slightly higher implementation rate of waste reduction, sorting, and recycling than hotels.

Furthermore, as illustrated in Table 2.9, both hotels and ryokan have lower implementation levels in particular areas of encouraging guests to bring their own amenities (14%), followed by the avoidance of single-use packaging for small items (16%), and minimisation of food leftovers (17%) (Kyoto GPN, 2010). Gössling et al. (2011) argue that food waste could be minimised by serving food in small portions to avoid overloading plates with food, or arranging buffets instead of table

service to provide small overall amounts of each food component.

Table 2.8 Implementation levels of waste management in accommodation

Region / Country	Sample size	Waste reduction	Waste sorting / recycling	Avoid throw-away packaging	Compost food leftovers	Reuse the use of materials	Source
England	64 (Plymouth)		52%	15.6%			Hobson & Essex (2001)
	417		>93%				Coles & Zschiegner (2011)
Japan	66 (Kyoto)		30%	43%	33%	>84%	Niga et al. (2002)
	70 (Kyoto)	17%		>16%	24%	>83%	Kyoto GPN (2010)
	33		>94%		84%		Ueoka & Kanaya (2012)
Sweden	225		30.6%	61.8%			Bohdanowicz (2006)
Poland	124		80%	50%			
Accra, Ghana	52	17.30%		8%			Mensah (2006)
	200				2.31	3.02	Mensah (2014)
Turkey	54 (Ankara)		30%				Erdogan & Baris (2007)
	73 (Central Anatolia)	1.01					Erdogan & Tosun (2009)
Macau, China	37	77.8%	3.2%			4.2%	Wan (2007)
	31		>10%	>26.7%			Wan et al. (2017)
New Zealand	94	>79%	99%				Ustad et al. (2010)
Catalonia, Spain	394		88%				Garay & Font (2012)
Mashhad, Iran	69		>70%				Aminian (2012)
USA	191		88%				Park (2009)
	217 (Michigan)		>46.1%	21%			Nicholls & Kang (2012)
Taiwan	45					3.57	Su et al. (2013)
Jordan	80		>10.4%			61.7%	Ali et al. (2014)
Thailand	23		96%		78%		Mishra (2016)

Note: Adapted from Su (2014).

Table 2.9: Implementation levels of reducing materials in Japanese hotels and ryokan

Response attributes	Level of implementation (%)
Encourage guests to bring their own amenities	14%
Avoid single-use packaging	16%
Minimisation of food leftovers	17%
Encourage guests to bring their own water bottle	20%
Compost food leftovers	24%
Avoid throw-away packaging for	31%
Apply reusable shipping cartons for supplies	36%
Provide reusable chopsticks	37%
Reduce throw-away materials used in restaurants	37%
Provide small-sized tissues in guest rooms	41%
Recover used cooking oil	51%
Promote returnable bottle of supplies	53%
Provide reusable slippers for guests	77%
Use soap dispenser or bottle	80%
Efficiently replace toilet paper rolls	83%

N=70

Note: Adapted from Kyoto GPN (2010)

2.3.6 Voluntary Environmental programmes

Education plays a critical role in raising knowledge and awareness levels in order to foster behavioural change (Scott et al., 2012). Voluntary environmental programmes associated with promoting sustainable behaviour embrace communication components (McKenzie-Mohr et al., 2012). For example, voluntary environmental programmes can be communicated in the form of in-room displays, such as leaflets and notices, to encourage guests to participate in environmental practices; the provision of travel information on public transport, cycle routes, and walks to encourage changes in transport behaviour; environmental training to employees; and carbon offsetting through guest donations (Bohdanowicz, 2006; de Grosbois, 2012; Kyoto GPN, 2010; Levy & Park, 2011; Medrado & Jackson, 2016; Mensah, 2006; Niga et al., 2002; Tzschentke, Kirk & Lynch, 2008). In addition, the evidence available shows that accommodation providers can reduce their energy use by 10-15% through voluntary environmental programmes, including training employees on how they can save energy use (Gössling, 2015a).

Implementation levels of voluntary environmental programmes by global accommodation

establishments are illustrated in Table 2.10. In particular, accommodation establishments in Japan and Taiwan are less engaged in environmental education or training to employees (Niga et al., 2002; Su et al., 2013). In relation to addressing climate change, Taiwanese hotels appeared even less involved in providing climate change-related and environmental education for guests and employees than implementing energy-saving education and incentives (Su et al., 2013). In terms of accommodation affiliations, chain-affiliated hotels provide guests with recommendations for saving energy and water to a greater extent than independent hotels (Rahman, Reynolds & Svaren, 2012).

Another voluntary environmental management approach is the adoption of carbon offsetting which is the voluntary purchase of carbon credits by tourists for accredited offsetting schemes such as energy efficiency, RE, and tree planting (Zeppel & Beaumont, 2013). Despite the considerable potential for applying carbon offsetting in accommodation to make a contribution to emissions reduction (Scott et al., 2012), overall participation levels are low (Levy & Park, 2011; Su et al., 2013). Only 6% of eco-certified accommodation providers mentioned the implementation of carbon offsetting programmes on their corporate websites (Nelson, 2010).

Table 2.10 Implementation levels of voluntary environmental programmes in accommodation

Region / Country	Sample size	Encourage the use of public transport, walks and bicycles	Energy-saving education/ incentives	Water-saving education/ incentives	Environmental education or training to staff	Carbon off-setting	Source
Plymouth, England	64	59%					Hobson & Essex (2001)
Japan	66 (Kyoto)	6%			6%		Niga et al. (2002)
	70 (Kyoto)	49%					Kyoto GPN (2010)
	33				70%		Ueoka & Kanaya (2012)
Sweden	225		40.4%	36.9%			Bohdanowicz (2006)
Poland	124		22.6%	18.5%			
Accra, Ghana	52		55.8%		72%		Mensah (2006)
	200		3.76		4.07		Mensah (2014)
Ankara, Turkey	54			27.5%	40%[1]		Erdogan & Baris (2007)
Macau, China	37		5.8%		59.3%		Wan (2007)
	31			80%	>40%		Wan et al. (2017)
England, USA, France	10			5.5[2]	>8.04[2]	3.97[2]	Levy & Park (2011)
Mashhad, Iran	69			75%			Aminian (2012)
USA	217 (Michigan)				37.4%		Nicholls & Kang (2012)
	172			3.30	3.25		Kim et al. (2015)
Slovenia	63				82%		Lebe & Zupan (2012)
New Zealand	242	1.9%			3.5%		Becken (2013b)
Taiwan	45	3.16	2.38		2.38	1.65	Su et al. (2013)
Jordan	98		44.3%		88.9%		Ali et al. (2014)
Queensland, Australia	83[3]			53%	58%		Zeppel & Beaumont (2014)
Thailand	23			96%	100%		Mishra (2016)

Note: Adapted from Su (2014).

[1]Calculation includes a response of 3-5 on a five-point scale ranging from none to very high levels of implementation.

[2] Based on a 10-point scale from low to high performance levels of CSR activities.

[3]Of the total number of Queensland tourism enterprises, 40 are accommodation providers.

2.3.7 Environmental Management Systems

Environmental management system (EMSs) are designed to serve as a management tool which can help to improve environmental performance of an organisation continuously in all aspects of business operations in accordance of a planned strategy (Ayuso, 2007). EMSs are applicable to the tourism industry, as it has been increasingly adopted by the hotel industry in particular since the 1990s (Ayuso, 2007; Newsome & Moore, 2015). Certified management systems in relation to sustainability include the International Organization for Standardization (ISO) 14001 for environmental management, ISO 50001 for energy management, and EU's Eco-Management and Audit Scheme (EMAS) (Ayuso, 2007; Bohdanowicz-Godfrey & Zientrana, 2015; Lebe & Zupan, 2012). There are also country-specific certification schemes, such as Canada's Green Leaf Eco-Rating Program, Leadership in Energy and Environmental Design (LEED) in the United States (US), and Costa Rican Certification for Sustainable Tourism (Graci & Dodds, 2015). One of the key benefits of certification schemes to businesses is to assist them with an educational procedure that assesses components of sustainability in their operational practices and the focus of their attention on making changes if needed, as well as reducing operating costs (Bohdanowicz-Godfrey & Zientrana, 2015; Graci & Dodds, 2015). For example, a case study of an international hotel in Hong Kong by Chan and Hawkins (2012) shows that EMSs are a key vehicle for the implementation and promotion of environmental management programmes in hotels because of the provision of a systematic structure of such programmes and the capacity to fill any gaps which exist in their actual environmental performance by identifying an area in which initiatives are lacking.

Ustad et al.'s (2010) survey of New Zealand hotels found that more than half of hotels (55%) had implemented EMS, while there was a small number of hotels (17%) that had not yet implemented EMS to monitor their environmental performance. The most significant reason for adopting EMS was natural resource conservation, followed by potential benefits for operational cost savings (Ustad et al, 2010). In contrast to Ustad et al.'s finding, as indicated in Table 2.11, several other studies have found a small number or almost no accommodation businesses in some circumstances that have environmental certification in place.

Table 2.11 Implementation levels of EMS in accommodation

Region / Country	Sample size	EMS	Environmental certification schemes	Source
London, UK	42		36%	Knowles et al. (1999)
Sweden	225		26%	Bohdanowicz (2006)
Poland	124		0%	
New Zealand	94	55%	81% (Qualmark Green) 32% (Green Globe 21) 6% (ISO 14001)	Ustad et al. (2010)
Croatia	200		0% (ISO14001)	Peršić-Živadinov & Blažević (2010)
Crete, Greece	32		9.38% (ISO14001, EMAS)	Zografakis et al. (2011)
Hong Kong	48		10.7% (ISO14001)	Chan (2011)
Corfu Island, Greece	91		2% (ISO14001)	Nikolaou et al. (2012)
Michigan, USA	217	11.6%	3% (LEED)	Nicholls & Kang (2012)
Spain	2,116[1]		5.1% (ISO14001)	Segarra-Oña et al. (2012)
Taiwan	45	2.53	1.88	Su et al. (2013)

Note: Adapted from Nicholls & Kang (2012) and Su (2014)

[1]Based on 2008 database

2.3.8 Environmental Targets, Benchmarking, and Monitoring of Emission Performance

A wide range of benchmarking tools are now available, particularly for accommodation establishments, which allows for the assessment of their own benchmarks against their actual environmental performance including energy consumption and emissions, as well as providing guidance for potential improvements (Bohdanowicz, 2009; Gössling, 2011) (Table 2.12). With the advances in IT technology, accommodation businesses can develop the propagation of sustainability reporting on an online platform (Bohdanowicz-Godfrey & Zientrana, 2015). The majority of large and international hotel companies have developed their own internal benchmarking systems as well as reporting tools to monitor their performance (Bohdanowicz, 2009; Bohdanowicz-Godfrey & Zientrana, 2015). The potential benefits of environmental performance assessment systems applied in accommodation businesses include operational efficiency resulting from an improved bottom line, environmental conservation, increased market share, and the creation of more attractive CSR images to enhance customer and employee loyalty (Bohdanowicz-Godfrey & Zientrana, 2015).

Table 2.12 Implementation levels of target setting and monitoring of environmental practice

Region / Country	Sample size	Monitor environmental performance	Environmental management targets or benchmarks	Source
Kyoto, Japan	66		10%	Niga et al. (2002)
South West, UK	417		37.4%	Coles & Zschiegner (2011)
Jordan	80		61.3%	Ali et al. (2014)
USA	172	3.42		Kim et al. (2015)

2.4 Summary and Conclusions

The primary issues with respect to energy and water consumption in accommodation presented in this chapter highlighted the significant emissions sub-sector of tourism.

Having identified ways in which the accommodation industry contributes to emissions, the chapter has highlighted that he amount of energy and water use in accommodation is significantly influenced by operational characteristics, and the proportion of end use is varied at the destination scale. Given that Japanese accommodation establishments have a relatively higher level of energy consumption and thus generate higher emissions, this reviews highlights the need for addressing accommodation providers' environmental policies and communication.

A number of response attributes to climate change have been identified in the literature that Japanese accommodation providers could adopt. Technology innovation is heavily promoted towards emissions reduction and it also has the potential benefit of cost reduction by an enhancement of operational efficiency. In response to climate change, the behavioural change of accommodation providers is a crucial step as a means to reduce emissions in their business operations. Many of the measures which were discussed in this chapter are an integral part of broad environmental and CSR responses, although they can make a significant contribution to emissions reduction that is often not their immediate goal.

Chapter 3: Method

3.1 Introduction

This chapter explores the response of Japanese accommodation providers to climate change. As noted in Chapter 1, there is a significantly growing body of literature on tourism and climate change (Becken, 2013a; Scott et al., 2012). However, there are relatively few academic publications on climate change-related issues in the context of the Asian accommodation sector (UNWTO, 2014). There also appears to be a lack of detailed knowledge with respect to tourism-related climate change in Japan (UNWTO et al., 2008). In order to address these major knowledge gaps which exist in tourism research, Japanese accommodation establishments are selected in this study. Content analysis of corporate websites of accommodation providers in Kyoto Prefecture is conducted in order to identify the presence of attributes of the response to climate change.

This chapter details the methodological approach of this research. The sample population is identified with a brief description of Japanese accommodation categories followed by outlining several reasons for selecting these categories and the study location. Data collection method used in this research is provided in detail. This contains a description of content analysis, the attributes used in this analysis, and data coding and analysis. The chapter also covers a few limitations of conducting content analysis.

3.2 Sample design

A census study of accommodation providers in Kyoto Prefecture will be employed for this research. Accommodation types used in this study will include hotels, ryokan, and lodges, as the lodging industry in Japan is broadly classified into these three categories (Table 3.1). Hotels and ryokan in Japan are further divided into international and standard tourist accommodation establishments. This is based on the *Act of Development of Hotels for Inbound Tourists* implemented by the MLIT in 1949, which was designed to facilitate a registration system with the aim to improve Japanese accommodation businesses and attract international tourists (JTA,

2016b). Table 3.2 provides national facility standards required to register an international tourist hotel or ryokan.

Love hotels are also included in this research. Cooper (2013b, p. 115) describes the love hotel as a "very visible feature of the Japanese hotel landscape"; it is unique Japanese form of an accommodation facility. It is distinguished from the above mentioned accommodation types included in this study, in terms of business operations and facility criteria. Similar to hotels and ryokan, in love hotels, there is the availability of rooms, food and beverage services on the premises for guests. A clear difference is that love hotels are typically characterised as an accommodation for the purpose of guests engaging in sexual activity, with the feature of neon lights and flashy room design and an hourly rate of accommodation costs. There are legal regulations on areas where love hotels can operate, which differ across prefectures, as well as the age limit. Customers under 18 years are not permitted to access love hotels (*Act on regulating and adjusting entertainment and amusement business operations*, 2016). Even though operational characteristics and features of love hotels are very unique, such accommodation facilities are sometimes used by tourists as budget hotels because of charging per hour, not per person (Cooper, 2013b).

Nevertheless, despite the existing Japanese literature on the degree of involvement in environmental management practices by ryokan in responding to climate change (Kyoto GPN, 2010; Niga, et al., 2002), an inclusion of such a traditional cultural accommodation in the context of climate change has remained absent in English-language literature. Even for love hotels, an analysis of their environmental performance remains largely unexplored in both Japanese and English-language literature. Hall et al.'s (2016) systematic literature review identified that over 70% of the sampled studies focused on hotels with respect to their sustainable practices and the remaining studies examined self-catering accommodation and B&B. Several studies of accommodation providers (Becken, 2013b; Nicholls & Kang, 2012; Su et al., 2013) found that their perceptions of energy use and the level of implemented or planned energy savings measures vary according to accommodation categories. It is therefore critical to discover if there are any differences of ryokan and love hotel businesses in the way information about environmental practices is presented on corporate websites with other accommodation types.

Table 3.1 Accommodation characteristics of hotel, ryokan and lodges in Japan

		Hotel	Ryokan	Lodges
Definition of accommodation facility		Western-style accommodation establishment	Accommodation constructed with a Japanese style of traditional architecture	Accommodation constructed with a large number of guests sharing for overnight stays in a common space
Examples of accommodation types		Business hotel	*Onsen ryokan* (hot-spring ryokan)	Youth hostel
		Tourist hotel	*Ekimae ryokan (station ryokan)*	Capsule hotel (providing the sleeping space only)
		Resort hotel	*Kappo ryokan* (providing Japanese cuisine as the main service attribute)	B&B
		City hotel	*Kankou ryokan* (tourist ryokan)	Guest house
Guest room	Number of guest rooms	Minimum 10	Minimum 5	No limit to the number of beds
	Floor area per room (m^2)	More than 9	More than 7	More than 33 (net floor area)

Note: Adapted from MLIT (1948, 2015a)

Table 3.1 Legal criteria for international tourist hotels and ryokan

	Hotel	Ryokan
Number of guestrooms	More than 15	More than 10
Floor area per room (m²)	9m² for a single room 13m² for other types	7m² for a single *tatami*[1] room 9.3m² for other room types
Facility structure in guest rooms	Building design with sufficient natural light Entry door locks Clothes-hanging facility Telephone Sink with hot and cold running water Desk, table and chair(s) A bathroom or shower and a western-style toilet	Same as hotels Well-balanced traditional Japanese room design and structure *Tokonoma*[2] Adjoining rooms separated by a wall A/C units[3]
Lobby and lounge	Free and always accessible Tables and chairs Sufficient room size to meet the capacity of total guest numbers Restroom facilities for each sex nearby	Same as hotels Lobby/lounge needs to be matched with the building's interior design
Restaurant (hotel only)	Sufficient room size to meet the capacity of total guest numbers Available options for western-style breakfast Restroom facilities for each sex nearby	

Note: Adapted from JTA (2016b).

[1] Tatami is a Japanese floor mat

[2] Tokonoma is a recessed space used as an interior design displaying a seasonal flower arrangement and a scroll of calligraphy or painting.

[3] Ryokan facilities are permitted to not install A/C units in guest rooms if they are located in a warm or cold climate region where is no need for A/C units.

Kyoto Prefecture was selected as the sampling frame for three main reasons. First, Kyoto has experienced an increased annual average surface temperature of 2.1°C over the past 100 years (Kyoto Prefecture, 2014a). The increasing frequency of hot days, hot nights, heavy precipitation, and droughts has also been observed, while cold days have become less frequent, and these notable climatic trends are expected to continue (Kyoto City, 2015). The tourism industry is directly affected by water-related disasters induced by extreme weather events. For example, in 2013, intense rainfall caused by a typhoon triggered the overflow of the Katsura River, inundating nearby ryokan facilities and souvenir stores in Arashiyama, which is one of the major tourist destination sites in Kyoto (Nihon Keizai Shimbun, 2015; NewSphere, 2013). The total estimated damage from this disaster was JPY150 billion (NZD 2.1 billion) (MLIT, 2014).

The ecological footprint in Kyoto City is 30% higher than the global average and 10% lower than the Japanese national average (World Wildlife Fund [WWF] Japan, 2016). Based on this figure, 2.2 Earths would be required to support the lifestyle of Kyoto residents reflecting the amount of the planet's natural resources consumed by people that exceeds the Earth's capacity to generate natural resources (WWF Japan, 2016). For this reason, Kyoto makes a suitable study to examine the promotion of environmental practices by accommodation providers. However, complementing the city's contributions to environmental change and how the prefecture has been affected by weather events is the city's image.

The second reason with regard to global climate change is that Kyoto is internationally known for being the birthplace of "the Kyoto Protocol", which was an international agreement adopted in 1997 linked to the UNFCCC (Scott et al., 2012; UN, 1998). The protocol, which entered into force in 2005, was a joint effort among the industrialised nations and the European Union (EU) to commit to reducing GHG emissions (Gunawansa, 2011; Scott et al., 2012) and is frequently mentioned in the international media in relation to climate change,

e.g. BBC (2016), the Guardian (2016). For example, a Google search for the term "Kyoto Protocol" in August 2016 generated almost 2.5 million hits, highlighting the importance of this international agreement. In 2009, Kyoto was selected by the national government as an "Eco-Model City" (EMC) (MoE & ICLEI-Local Governments for Sustainability Japan, 2015). The EMC programme aims to transform the nation into a low-carbon society by supporting selected model cities that promote pioneering efforts to achieve ambitious targets for GHG emissions reduction (MoE & ICLEI-Local Governments for Sustainability Japan, 2015). Kyoto City has already established its own target for a 40% reduction in GHG emissions by 2030 from 1990 levels, and 60% by 2050, in order to meet the ultimate goal to become a zero-carbon city (Kyoto City, 2014a, 2016). Pro-environmental projects are also implemented to foster and cooperate with multi-stakeholders including residents and business enterprises through various participatory awareness programmes in Kyoto. For example, the accommodation industry has been encouraged to adopt energy-saving and low-carbon operational practices (Kyoto City, 2014b).

Third, Kyoto is one of the major tourist destination sites in Japan. Kyoto is widely acknowledged as an ancient Japanese city due to its history as the country's capital and the emperor's residence which flourished for more than 1000 years (Discover Japan Travel, 2013; Kyoto Prefecture, n.d.). At the time of writing, Kyoto has 17 World Heritage sites and conservation of these cultural heritage sites, Japanese gardens, and traditional architecture, including ryokan, is highly considered as a vital component of the landscape of Kyoto to enhance destination branding (Kyoto City, 2014b). The hospitality sector, which includes tourist accommodation, plays a significant role in contributing the highest sectoral gross product (21.1%) to the local economy (Kyoto City, 2016a). Furthermore, Kyoto attracted 5.68 million tourist arrivals in 2015 (Kyoto City, 2016c). One of the driving forces of inbound tourism growth is that in 2014 and 2015, Kyoto was nominated as the world's top city to visit by the reader's vote in the American

travel magazine, "*Travel + Leisure*" (Kyoto City, 2016c; Lieberman, 2015; Travel + Leisure, n.d.). A significant surge in inbound tourism recorded 3.16 million international overnight visitors in Kyoto in 2015, with a 73% rise from the previous year (Kyoto City, 2016c). This marked the highest number of international overnight arrivals ever recorded and surpassed the 47.1% growth rate of international arrivals in Japan from 2014 to 2015 (Kyoto City, 2016c; JNTO, 2016a). Kyoto has the fourth largest number of overseas visitors who stayed at accommodation facilities overnight while travelling in Japan (JTA, 2016a). In Kyoto, ryokan facilities are the second dominant category of accommodation establishments after lodges according to the Kyoto Prefecture (2014b) data, so their inclusion provides a more representative sample.

3.3 Data collection

Content analysis was employed as the primary research tool in order to achieve the research objective of the study. Data collection took place over three months, from the period of September 2016 to November 2016.

3.4 Content analysis

Content analysis is defined as a research technique for "the systematic, objective, quantitative analysis of message characteristics" (Neuendorf, 2002, p. 1). It is an empirical observational research method which enables the researcher to analyse content of any forms of recorded communication relevant to the actual phenomena that are of a social, public and political nature (Krippendorff, 2004; Neuendorf, 2002). Content analysis has been growing in usage as a research tool in a diverse range of disciplines, such as mass communication, political sciences, psychology, linguistics and history (Krippendorff, 2004). Content analysis reduces data by distinguishing between relevant and irrelevant parts of material in terms of explicit themes and aspects of media (Schreier, 2012).

Content analysis has also grown as a research tool in the field of tourism studies (Stepchenkova, Kirilenko & Morrison, 2009). These include destination image analysis (Stepchenkova et al., 2009), ecotourism research (Donohoe & Needham, 2006, 2008; Sirakaya, Sasidharan & Sönmez, 1999), and tourism policy issues (Hall & Valentin, 2005). With advances in information and communication technologies, the World Wide Web has become a powerful medium which enables the tourism industry to disseminate information regarding their offerings in a dynamic form of interactive communications with customers (Buhalis & Law, 2008; Gretzel, Yuan & Fesenmaier, 2000). The Web also functions as the dominant source of tourism information acquisition for tourists to facilitate their destination decision-making processes (Donohoe & Needham, 2008). Since the late 1990s, Web content analysis has been increasingly used to examine the effectiveness of tourism websites and analyse Web traffic (Hall & Valentin, 2005). Examples include Choi, Lehto and Morrison's (2007) study of visual and textual representations of Macau as a tourist destination in different information sources of tourism websites. A comparative study can be also applied in content analysis, such as comparing destination images of Russia within tourism information websites of the US and Russia (Stepchenkova & Morrison, 2006).

The use of Web content analysis is not only limited to the destination level, but is also applicable to the industrial level of tourism, such as the study of accommodation websites. This allows for identification and measurement of the performance attributes of hotel websites (Chung & Law, 2003).

Another applied context in tourism and hospitality research is that of an evaluation of the CSR reporting practices disclosed by hotel companies on their corporate websites (Cherapanukorn & Focken, 2014; de Grosbois, 2012; de Grosbois & Fennell, 2011; Holcomb, Upchurch & Okumus, 2007; Jenkins & Karanikola, 2014; Medrado & Jackson, 2016; Nyahunzvi, 2013; Pérez & del Bosque, 2014). The internet is considered as an important channel of online

communication of hotels' green practices and it is reflective of their heavy reliance on the internet (do Paço, Alves & Nunes, 2012). Furthermore, an understanding of environmental issues in the accommodation contexts has been the focus of study of the issue-attention cycle. Hsieh (2012) examined the extent to which hotels disclose information about their environmental management policies and practices to the public on their websites. The provision of corporate websites is an effective online platform for communicating environmental goals and commitments to stakeholders (Hsieh, 2012; Paul, 2008). Apart from the use of corporate websites, online hotel reviews have been adopted as an important new source of web content analysis to understand customers' perceptions of green practices by hotels (Yi, Li & Jai, 2016).

There have been very few studies of tourism website content specific to the response of the tourism businesses to climate change. For example, Nelson (2010) sought to identify information provided on eco-certified accommodations' websites about their measures to reduce energy and GHG emissions. A similar study was undertaken by de Grosbois and Fennell (2011) who investigated the content of carbon footprint-related initiatives in responding to climate change that were provided on international hotel companies' websites. Zeppel and Beaumont (2012a) extracted textual content relevant to climate change responses of tourism enterprises from Australian government tourism agencies' websites.

Given the importance of public disclosure of environmental information for the tourism and hospitality industry, accommodation websites are used for content analysis. Other additional units of analysis included in accommodation providers' websites are their blogs and CSR reports.

In the absence of reliable prefectural databases, a number of tourism industry websites and online directories were used to compile listings of accommodation establishments in Kyoto

Prefecture. The online sources used were Kyoto Prefecture's official tourist accommodation website (www.kyotoryokan.com); Kyoto Tourism Association's website (www.kyokanko.or.jp); Kyoto's accommodation information website (www.kyo-yado.com); Kyoto love hotel information website (www.kyotohotel.ne.jp); and Nippon Telegraph and Telephone Corporation's (NTT) I Town Page website (itp.ne.jp). Online travel review website TripAdvisor (www.tripadvisor.jp) and love hotel information and review website (couples.jp) were also used to create a complete list of accommodation providers in Kyoto Prefecture, as well as coding the accommodation facility's online review score. Alongside the use of online sources, accommodation providers who have responded to Kyoto GPN's (2010) survey were used for sample collection.

3.5 Content analysis attributes

For the purposes of content analysis, a coding frame was constructed consisting of seven dimensions of environmental measures. These dimensions include energy, water, and waste conservation measures; green purchasing; voluntary environmental schemes; internal environmental practices; and the mention of climate change-related keywords. Response attributes which constitute each dimension were specified by using measures that have been previously identified in studies on the accommodation industry's response to climate change, as well as CSR practices. Recommended environmental measures in accommodation businesses developed by the UNWTO et al. (2008) were also used as a guide for identifying response attributes. More importantly, this study integrated attributes identified by Japanese researchers (Iwabuchi, 2009; Kunori & Kobayashi, 2007; Kyoto GPN, 2010; Nakajima et al., 2009; Nakano et al., 2012; Niga et al., 2002; Sasayama, 2014; Tachibana et al., 2009; Ueoka & Kanaya, 2012) into the development of coding frame. For example, vending machines are commonly installed in Japanese lodging facilities, particularly hotels and ryokan, so this takes into account if accommodation providers removed vending machines to reduce electricity

demand. Microsoft Excel spreadsheet was used to categorise attributes and a total of 27 accommodation attributes were identified for analysis (Table 3.2).

Table 3.2: Attributes of environmental measures for accommodation used in content analysis

Dimension	Attribute	Practice	Description	Publications
Energy conservation measures	Energy-efficient lighting	LED lights or compact fluorescent light (CFL) bulbs	Whether an accommodation provider installs new light technology and/or switching off appliances to reduce energy use. A heated-seat bidet toilet is adopted and installed by an electrical connection in the accommodation industry in Japan. Accommodation providers can reduce energy use by installing an energy-efficient type of bidet-toilets (Kyoto GPN, 2010).	Becken (2005, 2013b); Becken & Dolnicar (2016); Bohdanowicz (2006); Chan et al. (2017); Cherapanukorn & Focken (2014); Coles & Zschiegner (2011); Coles et al. (2013); Curtis (2002); de Grosbois (2012); de Grosbois & Fennell (2011); Erdoğan (2007); Hsieh (2012); Iwabuchi (2009); Jackson (2010); Jenkins& Nicholls (2010); Kyoto GPN (2010); Levy & Park (2011); Mensah (2006, 2014); Nelson (2010); Nicholls & Kang (2012); Niga et al. (2002); Nikolaou et al, (2012); Richins & Scarinci (2009); Sasayama (2014); Scott et al. (2012); Trung & Kumar (2005); Tsai et al. (2014); Tzschentke et al. (2008); Zeppel & Beaumont (2012b, 2013, 2014)
	Power-saving appliances	Power-control room card or key		
		Timer and occupancy sensors		
		Master switches		
		Energy-efficient bidet-toilets		
		A high-efficiency A/C system		
	Control units for A/C system		Whether accommodation providers install control units or digital measurement for A/C to adjust room temperatures.	Becken (2013b); Chan et al. (2017); Kyoto GPN (2010); Niga et al. (2002); Nikolaou et al. (2012); Önüt and Soner (2006); Richins & Scarinci (2009); Trung & Kumar (2005); Zeppel & Beaumont (2014)
	Reduce the need for electrical appliances	Switching off electric appliances when not in use	Whether accommodation providers take action to reduce the use of electric appliances, such as turning off A/C and switching off electric kettles when not in use (Kyoto GPN, 2010).	Ali et al. (2008); Kyoto GPN (2010); Gössling (2011); Mensah (2006); Niga et al. (2002); Sasayama (2014); Scott et al. (2012); Trung & Kumar (2005); Tzschentke et al. (2008)
		Removal of TV sets in guest rooms/ vending machines in facility		

Clean and maintain electricity facilities	Clean filters and coils in A/C units		Niga et al. (2002); Nikolaou et al. (2012); Önüt & Soner (2006); Zografakis et al. (2011)
Reduce energy use for hotel swimming pools	Heat pumps	Whether an accommodation uses heat pumps to reduce energy consumption for hotel pools while reducing heat loss by pool cover installations.	Becken (2013b); Chan & Lam (2003); Coles et al. (2011, 2013, 2015); de Grosbois (2012); Gössling et al. (2012); Javis & Ortega (2010); Scott et al. (2012)
	Pool covers		
Alternative fuels and renewable energy sources	PV installations, biomass, wind, thermal, geothermal, waste	Whether an accommodation replaces fossil fuels with renewable energy sources by a green energy purchase or on-site generation to improve energy efficiency.	Becken (2005, 2013b); Becken & Dolnicar (2016); Becken & Hay (2007); Bohdanowicz (2006); Chan et al. (2008); Chan et al. (2017); Coles et al. (2011, 2013); Curtis (2002); Dalton et al. (2007, 2008, 2009); de Grosbois (2012); de Grosbois & Fennell (2011); Iwabuchi (2009); Javis & Ortega (2010); Kasim (2009); Kyoto GPN (2010); Levy & Park (2011); Mensah (2006); Medrado & Jackson (2010); Nelson (2010); Niga et al. (2002); Önüt & Soner (2006); Trung & Kumar (2005); Tsai et al. (2014); Zeppel & Beaumont (2012b, 2013, 2014)
	Solar energy panels		
	Solar water heaters		
	Cogeneration		
	Efficient boilers		
	Heat recovery system		
	Solar window film		
	Biodiesel for vehicle fuel		

	Adapt building design, construction and renovations	Insulation	Natural sources used in building materials, such as diatomaceous earth and solid wood, are taken into account as they have an energy-efficient effect (Kyoto GPN, 2010; Nakajima et al., 2009).	Becken (2005, 2013b); Bohdanowicz (2006); Chan et al. (2017); Coles & Zschiegner (2011); Coles et al. (2013, 2014, 2015); de Grosbois (2012); de Grosbois & Fennell (2011); Farrou et al. (2016); Jenkins & Nicholls (2010); Kyoto GPN (2010); Leslie (2007); Nelson (2010); Niga et al. (2002); Sasayama (2014); Trung & Kumar (2005); Zeppel & Beaumont (2012b, 2014)
		Natural ventilation		
		Double/triple glazing throughout		
Water conservation measures	Water-saving devices	Low-flow showerheads/taps	Whether the accommodation installs water-saving fixtures in guest bathrooms to limit overall water consumption.	Becken (2013b); Becken & Dolnicar (2016); Bohdanowicz (2006); Chan et al. (2017); Cherapanukorn & Focken (2014); Coles & Zschiegner (2011); Coles et al. (2013, 2014, 2015); de Grosbois (2012); Gössling et al. (2012); Hsieh (2012); Iwabuchi (2009); Mensah (2006, 2014); Niga et al. (2002); Önüt & Soner (2006); Richins & Scarinci (2009); Styles et al. (2015); Trung & Kumar (2005); Zeppel & Beaumont (2014)
		An adjusted or retrofitted float level in the toilet water tank.		
		Water-saving bidet-toilet		
	Water recycling	Grey water system	Whether an accommodation provider reclaims grey water and/or rainwater.	Bohdanowicz (2006); Coles & Zschiegner (2011); Coles et al. (2013, 2014); Chan et al. (2017); Chung & Parker (2010); Gössling et al. (2012); Jackson (2010) Kasim (2009); Kyoto GPN (2010); Trung & Kumar (2005); Zeppel & Beaumont (2013, 2014)
		Rainwater collection		

	Towel/linen reuse programme		Whether an accommodation applies an economical wash cycle for laundry operations to reduce water usage.	Becken (2013b); Bohdanowicz (2006); Coles & Zschiegner (2011); Coles et al. (2013, 2014); Iwabuchi (2009); Jenkins & Nicholls (2020); Kyoto GPN (2020); Levy & Park (2011); Niga et al. (2002); Richins & Scarinci (2009); Tzschentke et al. (2008)
Green purchasing	Low-carbon food/beverage offerings	Seasonal ingredients	Whether accommodation uses local and seasonal foodstuffs to prepare meals. Locally produced drinks are also included in assessment. Organic products include organic linens and towels (Nicholls & Kang, 2012). Other textile products, such as carpets with low-environmental impacts (de Grosbois, 2012), are also taken into account. Gössling et al. (2011) recommended foodservice providers serve dishes with a larger proportion of vegetables than carbon-intensive foods including meats.	Bohdanowicz (2006); de Grosbois (2012); Kyoto GPN (2010); Levy & Park (2011); Mensah (2014); Medrado & Jackson (2010); Nakano et al. (2012); Nicholls & Kang (2012); Niga et al. (2002); Tachibana et al. (2009); Zeppel & Beaumont (2014)
		Local sourcing of ingredients		
		Vegetarian options		
	Use fair trade products			Bohdanowicz (2006); de Grosbois (2012); Hsieh (2012); Kyoto GPN (2010); Levy & Park (2011); Mensah (2006, 2014); Medrado & Jackson (2010); Nicholls & Kang (2012); Niga et al. (2002); Tzschentke et al. (2008)
	Use organic raw materials and products	Purchase or on-site production		

	Environmentally friendly products	Purchase recycled supplies	Whether an accommodation provider mitigates climate change-related impacts of their business operations by purchasing environmentally friendly products. Recycled supplies include stationery (de Grosbois, 2012).	
		Use sustainably grown wood for furniture or products		
		Purchase non-toxic cleaning products		
Waste management measures	Waste recycling and minimisation	Separate and recycle non- or biodegradable waste	Accommodation providers can reduce the substantial amount of overall waste generated, as well as recycle most of the remaining waste (Simpson et al., 2008).	Becken & Dolnicar (2016); Bohdanowicz (2006); Chan et al. (2017); Coles & Zschiegner (2011); Coles et al. (2013, 2014); Cherapanukorn & Focken (2014); Chung & Parker (2010); Curtis (2002); de Grosbois (2012); Erdoğan (2007); Hsieh (2012); Iwabuchi (2009); Kasim (2009); Kyoto GPN (2010); Mensah (2006, 2014); Medrado & Jackson (2010); Nicholls & Kang (2012); Niga et al. (2002); Richins & Scarinci (2009); Trung & Kumar (2005); Tzschentke et al. (2008); Zeppel & Beaumont (2012b, 2013, 2014)
		Composting food, garden waste		
		Minimise food leftovers		

	Reduce the use of materials	Install refillable soap and shampoo dispensers	Whether an accommodation provider reduces resource use in order to avoid waste generation. Kyoto GPN (2010) and Niga et al. (2002) mention that accommodation providers can minimise waste by offering reusable items for guest use instead of disposable ones, such as slippers and chopsticks.	Ali et al. (2014); Becken & Dolnicar (2016); Bohdanowicz (2006); Chan et al. (2017); de Grosbois (2012); Iwabuchi (2009); Kyoto GPN (2010); Nicholls & Kang (2012); Niga et al. (2002); Qian & Schneider (2016); Richins & Scarinci (2009); Trung & Kumar (2005); Tzschentke et al. (2008)
		Minimise the provision of amenities		
		Purchase reusable and durable products		
		Reduce paper usage		
		Reduce throw-away packaging and disposable items		
		Reusing remaining toilet paper rolls and soaps from guestrooms for staff use		
Behaviour-related measures	Promote green vehicles, walking, public transport	Provide information on walks, public transport and cycle routes	Whether an accommodation fosters voluntary engagement of environmental programmes to encourage guests' and employees' awareness-raising and behavioural changes towards carbon emissions reduction. Environmental education includes energy and water conservation and waste management.	Becken (2013b); de Grosbois (2012); Gössling & Schumacher (2010); Kyoto GPN (2010); Levy & Park (2011); Niga et al. (2002); Tzschentke et al. (2008); Zeppel & Beaumont (2012b, 2014)
		Bicycle hires		
		Use of electric or hybrid-electric vehicles		

	Provide environment education or incentives	Encourage customers to bring their own personal care items	The provision of public transport information and walking and cycle routes includes tourist destination sites and/or accessing to accommodation. Energy-efficient transport modes lead to low emission levels, especially when renewable electricity is purchased or generated (Gössling, 2011).	Becken (2005, 2013b); Bohdanowicz (2006); Coles et al. (2014); Curtis (2002); de Grosbois (2012); Hsieh (2012); Kyoto GPN (2010); Mensah (2006, 2014); Medrado & Jackson (2010); Niga et al. (2002); Önüt & Soner (2006); Trung & Kumar (2005); Tzschentke et al. (2008); Ueoka & Kanaya (2012); Zeppel & Beaumont (2012b, 2014)
		Environmental training to employees		
		Leaflets, newsletters		
		Place in-room displays		
		Award programmes		
		Offer carbon neutral seminars		
	Offer carbon offsetting schemes	A tree planting scheme		Kunori & Kobayashi (2007); Levy & Park (2011); Medrado & Jackson (2010); Nelson (2010); Zeppel & Beaumont (2013, 2014)
	Hotel environmental management policy		Whether an accommodation develops a policy framework of environmental conservation in their business planning.	Coles et al. (2011); Mensah (2006); Richins & Scarinci (2009); Tzschentke et al. (2008)
	Environmental management targets and benchmarking		Whether an accommodation sets their own goals and criteria of pro-environmental initiatives.	Bohdanowicz (2009); Coles & Zschiegner (2011); Coles et al. (2013, 2014); Gössling et al. (2012); Medrado & Jackson (2010); Niga et al. (2002); Styles et al. (2015)

Implement Environmental Management System (EMS)	ISO14001 Kyoto environmental management system standard (KES) Eco-Action 21	Japanese environmental management standards are also included and they are KES, which was initiated by non-profit organisations, and Eco-Action 21 initiated by the MoE.	Iwabuchi (2009); UNWTO et al. (2008)
Monitor environmental performance	Monitor performance of water- and energy-saving devices Smart metering Review energy, resource/water consumption	Whether an accommodation has a monitoring tool of their environmental measures.	Ali et al. (2014); Bohdanowicz (2009); Chan et al. (2017); Coles & Zschiegner (2011); Coles et al. (2013, 2014); Gössling et al. (2012); Medrado & Jackson (2010); Niga et al. (2002); Styles et al. (2015); Tzschentke et al. (2008)
Local environmental conservation	Clean up programmes Sponsorship Charity	Whether an accommodation builds local and community networks to develop environmental sustainability at the local level.	de Grosbois (2012); Levy & Park (2011); Mensah (2006); Medrado & Jackson (2010); Niga et al. (2002)
Environmental conservation projects with other organisations or suppliers		Whether an accommodation collaborate with suppliers or other businesses, such as non-profit organisations, to address environmental/climate change-related issues.	de Grosbois (2012); Hsieh (2012); Kyoto GPN (2010); Medrado & Jackson (2010); Niga et al. (2002); Zeppel & Beaumont (2013, 2014)

Mention climate change-related keywords	If an accommodation mentions climate change-related keywords anywhere on their website. Differences in use of the term is considered given that the term 'climate change mitigation' is referred to as 'global warming measures' in Japan (*Act on Promotion of Global Warming Measures 1998*, MoE, 2016).	Zeppel & Beaumont (2012a)

3.6 Coding

A coding frame was piloted before the actual data analysis was commenced, in order to ensure the effectiveness of an application of all attributes. This helps identify the inevitable shortcomings of the coding frame and an adjustment of categories (Schreier, 2012). Company information on each of the selected websites was coded to enable a more detailed data with respect to accommodation characteristics (see Appendix A). These included the location of the accommodation provider (Kyoto City or outside of the city) and the type of the accommodation provider (hotel, ryokan, lodges, or love hotel). Hotels and ryokan were also classified into international and standard tourist hotels or ryokan by using the regional database of registered international tourist hotels and ryokan established by the MLIT. The accommodation provider's online rating on the TripAdvisor website was recorded as well as the love hotel's rating on its online review website. The response attributes of accommodation providers to climate change were extracted from both textual and visual materials on their websites as coding whether the attribute is present or not. However, specific services, such as food and beverage services and on-site swimming pools, are not catered for guests in some accommodation facilities, due to their accommodation and operational characteristics. In this case, these attributes will not be assessed for content analysis of accommodation providers as coding no service provision but will be for other accommodation providers. Taking into consideration the differences of the content of each language website, in the case of accommodation having an English-language website available, its content is also analysed along with the Japanese version of their website.

3.7 Data analysis

Once data collection of the web content is completed, a series of tables are created (see Chapter 4). These include the total number of times that the attributes are mentioned on the websites of all the accommodation providers examined. The frequencies of the attributes mentioned are also calculated in percentages to analyse if there are any differences of attributes by the type and region of accommodation. A statistically significant association in the dataset is analysed using chi-square tests and independent sample t-tests.

3.8 Limitation

A key limitation faced in this research is that given the absence of database of all existing accommodation providers in Kyoto Prefecture, it is difficult to capture all potential providers by only using online resources to create a complete list. A comprehensive sample collection should be needed, such as using offline sources which include phone and guide books, to meet the sufficient coverage of accommodation providers.

A second limitation of this research is that 246 accommodation providers failed to satisfy the criterion of having their own corporate websites, representing 21.4% of the total identified businesses. This is the most important reason for omitting these accommodation providers, particularly for love hotels and standard tourist ryokan, in the study. Thus, the number of love hotel which was used for the study was relatively small to make a comparison analysis of the presence of response attributes between accommodation categories.

3.9 Chapter summary and conclusions

The main goal of this study is to explore Japan's accommodation providers' responses to climate change. This study analysed in accommodation providers in the Kyoto Prefecture with providing justification for a chosen location in both tourism and climate change dimensions. A method of data collection was described briefly and applied into the study. Data collection was done by applying a content analysis through examining accommodation providers' websites and other units of analysis including their blogs and CSR reports, in order to document response attributes to climate change mentioned on the websites. A list of the attributes were extracted from a number of articles with respect to the response to climate change and CSR practices in an accommodation context. These attributes were mainly from those which were outlined in the previous chapter. The attributes which were identified by Japanese scholars (e.g. Iwabuchi, 2009; Niga et al., 2002; Ueoka & Kanaya, 2012) were also integrated into building a coding frame of the content analysis in order to take into consideration Japanese accommodation providers' approaches to environmental conservation including responding to climate change. The next chapter discusses the results of this study.

Chapter 4: Results

4.1 Introduction

This chapter presents the results of this study which has the primary objective of identifying accommodation providers' online communication of responses to climate change in Japan. The chapter first describes the number of accommodation websites identified in the stage of compiling database. The total number of websites analysed was based on four accommodation characteristics which include the accommodation provider's type, their location, tourist accommodation registration (hotels and ryokan), and online review rating.

Second, the results of the content analysis of accommodation providers' websites are reported in each dimension of response attributes. Chi-square tests and independent sample t-tests are applied to identify statistically significant associations between the response attributes and accommodation characteristics. For the purpose of readability, additional tables of results have been included in the appendices.

4.2 Results of Content Analysis

A total of 1,150 accommodation providers in Kyoto Prefecture were identified (Table 4.1). Of these accommodation providers, 246 businesses were omitted from the content analysis due to there being no corporate website, an operational closure, failure to access their website due to an invalid website address, or difficulty in analysing content due to garbled text. Thus, a valid total of 904 accommodation providers' websites (185 hotels, 272 ryokan, 405 lodges, and 42 love hotels), was used for the content analysis in this research. As shown in Table 4.2, of the total number of active accommodation providers' websites, 185 (20.7%) were hotels, comprising 29 (7%) international tourist hotels and 158 (17.5%) standard tourist hotels. Of the total number of accommodation providers, 270 (29.9%) were ryokan, of which 66 (7.3%) were international ryokan and 204 (22.6%) were standard tourist ryokan. The third accommodation category, lodges, represented 405 (44.8%) out of the total number of accommodation providers. The last category of accommodation providers examined was love hotels, which accounted for 42 (4.6%) out of the 904 accommodation providers.

Table 4.1 Identified and valid accommodation providers' websites for content analysis

Accommodation type	Identified providers	Valid providers	% valid in category
Hotel			
International tourist hotel	20	20	100%
Standard tourist hotel	177	165	93.22%
Total	197	185	93.91%
Ryokan			
International tourist ryokan	71	68	95.77%
Standard tourist ryokan	256	204	79.69%
Total	327	272	83.08%
Lodges	546	405	74.18%
Love hotel	80	42	52.50%
Total	1150	904	78.61%

Of the total number of accommodation providers' websites examined, 626 (69.25%) were located in Kyoto City and 278 (30.75%) were outside of the city in the larger Kyoto prefecture (Table 4.2). Taking the accommodation category into account, a total of 144 (23%) hotels were in Kyoto City and 41 (14%) were located outside. Of the total number of ryokan, 162 (25.9%) were in the city and 110 (36.9%) in the surrounding prefecture. Of the 405 lodges, 283 (45.2%) were in Kyoto City and 122 (43.9%) were outside of the city. Lastly, a total of 37 (6%) love hotels were in Kyoto City and five (1.8%) were in the prefecture. Table 4.3 illustrates the TripAdvisor and love hotel ratings of all accommodation providers. TripAdvisor ratings are further classified according to the types of accommodation (Table 4.4).

Table 4.2 Accommodation types and location

Accommodation type	Location		Total
	Kyoto City	Outside of the city	
Hotel			
International tourist hotel	18 (2.9%)	2 (0.7%)	20 (2.2%)
Standard tourist hotel	126 (20.1%)	39 (14%)	165 (18.3%)
Total	144(23%)	41 (14.7%)	185 (20.5%)
Ryokan			
International tourist ryokan	47 (7.5%)	21 (7.6%)	68 (7.5%)
Standard tourist ryokan	115 (18.4%)	89 (32%)	204 (22.6%)
Total	162 (25.9%)	110 (39.6%)	272 (30.1%)
Lodges	283 (45.2%)	122 (43.9%)	405 (44.8%)
Love hotel	37 (6%)	5 (1.8%)	42 (4.6%)
Grand Total	626 (69.2%)	278 (30.8%)	904 (100%)

Table 4.3 Accommodation providers' online review ratings

	Frequency	%
TripAdvisor rating		
No TripAdvisor rating	294	34.1
TripAdvisor rating of 1	7	0.81
TripAdvisor rating of 1.5	1	0.22
TripAdvisor rating of 2	8	0.12
TripAdvisor rating of 2.5	13	1.51
TripAdvisor rating of 3	35	4.1
TripAdvisor rating of 3.5	96	11.14
TripAdvisor rating of 4	190	22.04
TripAdvisor rating of 4.5	168	19.49
TripAdvisor rating of 5	50	5.8
Total	*862*	*100*
Love hotel rating		
No rating	10	23.81
Rating of 1	1	2.38
Rating of 1.9	1	2.38
Rating of 3.2	1	2.38
Rating of 3.3	1	2.38
Rating of 3.4	1	2.38
Rating of 3.5	3	7.14
Rating of 3.6	2	4.76
Rating of 3.8	3	7.14
Rating of 3.9	4	9.52
Rating of 4	5	11.9
Rating of 4.1	1	2.38
Rating of 4.2	2	4.76
Rating of 4.3	1	2.38
Rating of 4.5	3	7.14
Rating of 4.6	1	2.38
Rating of 4.7	1	2.38
Rating of 4.9	1	2.38
Total	*42*	*100*

Table 4.4 TripAdvisor rating by type of accommodation

TripAdvisor rating	Hotel	Ryokan	Lodges
No TripAdvisor rating	29 (10.2%)	84 (28.2%)	181 (61.6%)
TripAdvisor rating of 1	0 (0%)	4 (57.1%)	3 (42.9%)
TripAdvisor rating of 1.5	0 (0%)	0 (0%)	1 (100%)
TripAdvisor rating of 2	3 (37.5%)	1 (12.5%)	4 (50%)
TripAdvisor rating of 2.5	4 (30.8%)	2 (15.4%)	7 (53.9%)
TripAdvisor rating of 3	9 (25.7%)	11 (31.4%)	15 (42.9%)
TripAdvisor rating of 3.5	44 (45.8%)	27 (28.1%)	25 (26%)
TripAdvisor rating of 4	63 (33.7%)	65 (33.7%)	62 (32.6%)
TripAdvisor rating of 4.5	30 (17.9%)	69 (41.1%)	69 (41.1%)
TripAdvisor rating of 5	3 (6%)	9 (18%)	38 (76%)

4.2.1 Energy-conservation measures

Table 4.5 provides a summary of frequencies and percentages for the response attribute to climate change identified from the examined websites of accommodation providers in Kyoto. Overall, only less than 10% of accommodation providers mentioned energy-conservation practices on their websites (Table 4.5). Energy-efficient building design (8.52%) was the most popular attribute mentioned on the accommodation providers' websites. Specifically, the use of natural sources as part of the building materials was more prominent than other identified attributes, such as insulation and double glazing. The installation of control units and the use of alternative fuels/RE sources were found to be the least mentioned response attributes (see Table 4.5). Examples of alternative fuels/RE sources which were commonly introduced by 27 (2.99%) of accommodation providers included solar panels, cogeneration, solar window films, efficient boilers, and self-produced biodiesel for vehicle. Although a total of 19 accommodation providers mentioned the availability of on-site swimming pools in their facility, energy reduction was not mentioned on any of their websites.

Table 4.5 Accommodation providers' response attribute frequencies and percentages

Response attribute	Frequency	% (Out of 904)
Energy conservation		
Energy-efficient lighting	50	5.53
Power-saving appliances	33	3.65
Control units	13	1.44
Reduce the need for using electrical appliances	76	8.41
Clean and maintain electrical facilities	45	4.98
Use alternative fuels/RE sources	27	2.99
Energy-efficient building design	77	8.52
Reduce energy use for hotel pool	0	0
Water conservation		
Water-saving devices	25	2.77
Water recycling	1	0.11
Towel/linen reuse	110	12.17
Green purchasing		
Low carbon food	494	54.65
Fair trade product	1	0.11
Organic product	77	8.52
Purchase environmentally friendly	117	12.94
Waste management		
Waste reduction and recycling	44	4.87
Reduce the use of materials	377	41.7
Voluntary behavioural change		
The provision of information on public transport	678	75
Environmental education/incentives for guests and staff	119	13.16
Carbon offsetting schemes	7	0.77
Internal environmental practices		
Implement environmental policy	43	4.76
EMS	27	2.99
Environmental targets and benchmarking	35	3.87
Review the environmental performance	30	3.32
Community-oriented activities	43	4.76
Involve in environmental conservation projects	29	3.21
Mention climate change-related keywords	96	10.62

N=904

As shown in Table 4.6, hotels had over 10% of most of the energy-saving measures mentioned, with two exceptions of control units (4.3%) and reducing energy use for hotel pool (0%). In particular, hotels had higher percentages of energy-efficient lighting (17.8%) and building design

(16.8%). Ryokan had a higher rate (10.7%) of reporting energy-efficient building design. Control units (0.4%) and reducing energy use for swimming pool (0%) were the least mentioned attributes, which were similar to the findings of hotels. Reducing the need for electrical appliances was the most commonly stated among lodges (10.4%), while power-saving appliances (0.7%) were the least mentioned. In addition, among the affirmative category that mentioned reducing the need for electrical appliances, a higher rate of lodges (40.8%) revealed involved in such practices than hotels (32.9%) and ryokan (26.3%). For example, they mentioned a removal of TV sets or mini-fridges from guest rooms, no installation of an elevator, laundry, or using fans instead of A/C units in facility. While lodges taking a more conventional approach to reduce energy use, hotels and ryokan appeared more oriented with voluntary behaviour, such as turning off the electric power until guests' arrival or their actual usage of in-room electrical appliances. Surprisingly, only two love hotels mentioned energy-efficient lighting and one stated cleaning and maintaining electrical facilities on their websites and no other attributes of energy conservation were stated (Table 4.6).

Table 4.6 Energy conservation by accommodation type

Energy-saving attribute	Hotel			Ryokan			Lodges			Love hotel		
	Freq		% of total category that mentioned	Freq		% of total category that mentioned	Freq		% of total category that mentioned	Freq		% of total category that mentioned
	Yes	No		Yes	No		Yes	No		Yes	No	
Energy-efficient lighting	33	152	17.8%	11	261	4%	4	401	1%	2	40	4.8%
Power-saving appliances	22	163	11.9%	8	264	2.9%	3	402	0.7%	0	42	0%
Control units	8	177	4.3%	1	271	0.4%	4	401	1%	0	42	0%
Reduce the need for electricity appliances	25	160	13.5%	20	252	7.4%	31	374	7.7%	0	42	0%
Clean and maintain electrical facilities	21	164	11.4%	12	260	4.4%	11	394	2.7%	1	41	2.4%
Use alternative fuels/RE sources	20	165	10.8%	5	267	1.8%	4	401	1%	0	42	0%
Energy-efficient building design	31	154	16.8%	29	243	10.7%	17	388	4.2%	0	42	0%
Reduce energy use for hotel pool	0	15	0%	0	4	0%	-	-	-	-	-	-

Chi-square tests were used to assess whether statistically significant associations existed between the energy conservation measures and accommodation types, location, and online review ratings. The results revealed statistically significant associations at the significant level of 5%, between accommodation types and all of the energy conservation attributes, including energy-efficient lighting (χ^2=70.82, p=0.000); power-saving devices (χ^2=47.46, p=0.000); control units (χ^2=14.24, p=0003); reducing the need for electrical appliances (χ^2=10.81, p=0.013); cleaning and maintaining electrical facilities (χ^2=21.05, p=0.000); alternative fuels/RE sources (χ^2=43.91, p=0.000); and energy-efficient building (χ^2=31.33, p=0.000). These attributes were more prominent among hotels in comparison to other accommodation types, as displayed in Table 4.6.

Chi-square tests also revealed statistically significant associations between the tourist accommodation registration and two energy-saving practices. For example, significant associations were found between the tourist registration accommodation and energy-efficient building design (χ^2=8.80, p=0.003), and cleaning and maintaining electrical facilities (χ^2=9.28, p=0.002). Higher percentages (22.7% and 14.8%, respectively) of international tourist accommodation providers mentioned such measures than standard ones (10.8% and 5.4%, respectively).

As shown in Table 4.8, a higher percentage of accommodation providers in Kyoto City reported energy-saving attributes on their websites than those in the surrounding prefecture. One exception was that accommodation providers outside of the city had a higher percentage of energy-efficient building design than those in the city (Table 4.7). Chi-square test revealed a statistically significant association of location with the majority of the energy conservation measures, including energy-efficient lighting (χ^2=8.74, p=0.003); power-saving appliances (χ^2=7.55, p=0.006); control units (χ^2=5.86, p=0.016); reducing the need for electricity appliances (χ^2=18.08, p=0.000); cleaning electrical facilities (χ^2=12.90, p=0.000); and building design (χ^2=6.25, p=0.012).

Table 4.7 Accommodation providers' energy conservation by location

Response attribute	Kyoto City			Outside of the city		
	Mentioned	Not mentioned	% of total category that mentioned	Mentioned	Not mentioned	% of total category that mentioned
Energy-efficient lighting	44	582	7%	6	272	2.2%
Power-saving appliances	30	596	4.8%	3	275	1%
Control units	13	613	2.1%	0	278	0%
Reduce the need for electricity appliances	69	557	11%	7	271	2.5%
Clean and maintain electrical facilities	42	584	6.7%	3	275	1%
Use alternative fuels/RE sources	22	604	3.5%	12	266	4.3%
Energy-efficient building design	63	563	1%	14	264	5%
Reduce energy use for hotel pool	0	626	0%	0	278	0%

Based on the response attributes being mentioned or not, independent sample t-tests were applied to identify significant differences in average TripAdvisor ratings of accommodation providers, with the exception of love hotels. Thus, love hotels were examined using a different rating scale which was gathered from the Japanese love hotel online review website. Significant differences were found between TripAdvisor rating and each of three energy-saving attributes; control units (t=-7.7, p=0.000), reduce the need for energy use (t=-3.20, p=0.002), and clean and maintain electrical facilities (t=-2.7, p=0.009). On average, accommodation providers who mentioned control units had a higher TripAdvisor rating (M=3.77, SE=0.13) than those who did not (M=2.61, SE=0.07). The similar mean values were also found in both reducing the need for energy use and cleaning and maintaining electrical facilities. On average, accommodation providers who mentioned reducing the need for energy use had a higher rating (M=3.22, SE=0.19) than those who did not (M=2.57, SE=0.07). The average rating for accommodation providers that mentioned cleaning and maintaining electrical facilities was higher (M=3.27, SE=0.24) compared to those that did not mention this attribute on their websites (M=2.59, SE=0.07).

4.2.2 Water management

Among the three examined water-saving measures, the towel/linen reuse programme appeared the most common attribute mentioned on the accommodation websites (Table 4.5). This was apparent in hotels and lodges, which had higher rates (13% and 20.7%, respectively) of involvement in such a practice in comparison to the other attributes of water management (Table 4.8). Ryokan had the highest percentage (1.5%) of mentioning water-saving devices, followed by the towel/linen reuse programme (0.7%). With regard to water recycling practices, only one hotel (0.11% of the total websites) stated that a rainwater storage tank is used for irrigation of gardens.

Of those accommodation providers which mentioned water-saving devices installed in their facility, hotels appeared as the highest percentage (16.8%) among accommodation categories. This indicated a statistically significant association between water-saving device installations and accommodation types (χ^2=65.13, p=0.000). Towel/linen reuse programme was more prominent

among lodges (20.7%) than hotels (13%) and ryokan (0.7%) (Table 4.9), and this association was statistically significant (χ^2=67.05, p=0.000).

Table 4.8 Water-saving measures by accommodation category

Response attribute	Freq		% of total category that mentioned	% of total affirmative category
	Yes	No		
Water-saving devices				
Hotel	21	164	16.8%	84%
Ryokan	4	268	1.5%	16%
Lodges	0	405	0%	0%
Love hotel	0	42	0%	0%
Water recycling				
Hotel	1	186	0.5%	100%
Ryokan	0	270	0%	0%
Lodges	0	405	0%	0%
Love hotel	0	42	0%	0%
Towel/linen reuse				
Hotel	24	161	13%	21.8%
Ryokan	2	270	0.7%	1.8%
Lodges	84	321	20.7%	76.4%
Love hotel	0	42	0%	0%

The results of chi-square tests revealed no statistically significant associations between the registration of tourist accommodation providers and water management attributes. In terms of the location, water-saving device installations was more prominently mentioned with accommodation providers in Kyoto City (3.7%) in comparison to those in the surrounding prefecture (0.7%) (Appendix B). This indicated a statistically significant association between these variables (χ^2=6.25, p=0012). A higher percentage (16.6%) of accommodation providers in the city also mentioned their implementation of the towel/linen reuse programme and this association was statistically significant (χ^2=37.64, p=0.000).

An independent sample t-test revealed a significant difference between the mention of water management measures and TripAdvisor ratings of accommodation providers (t=-6.81, p=0.000). On average, accommodation providers who mentioned the implementation of water-saving devices had a higher TripAdvisor rating (M=3.6, SE=0.14) than those who did not (M=2.6, SE=0.07). The same value of t and a significant difference of TripAdvisor rating was also found in the

towel/linen reuse programme (t=-6.81, p=0.000) that accommodation providers which involved in such a programme had a higher TripAdvisor rating (M=3.6, SE=0.14) than those who did not (M=2.5, SE=0.07).

4.2.3 Green Purchasing

The provision of low carbon food revealed the second highest response attribute mentioned on accommodation providers' websites among all the attributes examined, with a frequency rate of 54.65% (Table 4.5). This attribute was most commonly mentioned across all accommodation types, particularly hotels (70.8%) and ryokan (82%) (Table 4.9). The purchase of environmentally friendly products had the second highest rate of the mentioned attribute in the green purchasing dimension, followed by organic products. Specifically, an on-site organic food production was commonly mentioned by all types of accommodation providers, with the exception of love hotels. Other identified attributes of organic products included the use of towels which were made of organic cotton. Furthermore, examples of commonly stated attributes of environmentally friendly products used in ryokan and lodges included locally or nationally grown wood as part of the architecture and availability of a hot-water bottle for guests during the winter season. The provision of fair trade products was mentioned by only one accommodation provider (0.11% of the total websites).

In terms of the accommodation types, low carbon food was more prominent among ryokan (82%) than hotels (70.8%), lodges (33.3%), and love hotels (11.9%). This association was statistically significant (χ^2=345.36, p=0.000). Organic products were also prominently mentioned by hotels (12.4%) in comparison to ryokan (11.4%) and lodges (5.7%), and this association was statistically significant (χ^2=14.63, p=0.002). Similarly, there was a statistically significant association between the location of the accommodation provider and low carbon food (χ^2=128.21, p=0.000) and organic products (χ^2=10.12, p=0.001). Accommodation providers in Kyoto City had higher percentages of mentioning both low carbon food (43.3%) and organic products (6.5%) than those in the surrounding prefecture (low carbon food=80.21%, organic products=12.9%).

Table 4.9 Green purchasing by accommodation category

Response attribute by type of establishment	Freq			% of total category that mentioned	% of the total affirmative category
	Yes	No	No food service		
Low carbon food					
Hotel	131	42	12	70.8%	26.5%
Ryokan	223	32	17	82%	45.1%
Lodges	135	66	204	33.3%	27.3%
Love hotel	5	33	4	11.9%	1%
Fair trade product					
Hotel	1	186	0	0.5%	100%
Ryokan	0	270	0	0	0%
Lodges	0	405	0	0%	0%
Love hotel	0	42	0	0%	0%
Organic product					
Hotel	23	162	0	12.4%	29.9%
Ryokan	31	241	0	11.4%	40.3%
Lodges	23	382	0	5.7%	29.9%
Love hotel	0	42	0	0%	0%
Environmentally friendly products					
Hotel	25	160	0	13.5%	21.7%
Ryokan	41	231	0	15.1%	35.7%
Lodges	48	356	0	11.9%	41.7%
Love hotel	1	41	0	2.4%	0.9%

Chi-square tests showed statistically significant associations between the registration of tourist accommodation and all of the green purchasing attributes. As shown in Table 4.12, international tourist accommodation providers had higher percentages of mentioning all the attributes than standard tourist ones. Statistically significant associations were found between the registration of tourist accommodation and low carbon food (χ^2=18.35, p=0.000); fair trade products (χ^2=4.20, p=0.040); organic products (χ^2=7.81, p=0.005); and environmentally friendly products (χ^2=6.06, p=0.014).

There were no significant differences between the TripAdvisor ratings and green purchasing attributes. The same result was found in love hotel ratings.

4.2.4 Waste Management

The first response attribute of waste management, waste reduction and recycling, was mentioned by a total of 44 (4.9%) accommodation providers. The second attribute of reducing the use of materials had a higher rate (41.7%) which was mentioned by a total of 377 accommodation providers, as shown in Table 4.5 above. Of those accommodation providers stating participation in such measures, hotels had a higher percentage (14.6%) of stating waste reduction and recycling measures on their websites in comparison to ryokan (4.4%) and lodges (1%) (Table 4.10). Chi-square tests revealed a statistically significant association between these variables (χ^2=54.39, p=0.000). A similar observation was evident for reducing the use of materials which was more prominent among hotels (55.1%) in comparison to ryokan (36.8%), lodges (38.8%), and love hotels (45.2%). A statistically significant association between these variables was also found (χ^2=18.09, p=0.000). Both international tourist hotels and ryokan revealed a higher rate of stating their commitment to waste reduction and recycling practices (Appendix D).

Table 4.10 Waste management measures by accommodation type

Response attribute	Freq		% of total category that mentioned	% of total affirmative category
	Mentioned	Not mentioned		
Waste reduction and recycling				
Hotel	27	158	14.6%	62.8%
Ryokan	12	260	4.4%	27.9%
Lodges	4	401	1%	9.3%
Love hotel	0	42	0%	0%
Reduce the use of materials				
Hotel	102	83	55.1%	27%
Ryokan	100	172	36.8%	26.5%
Lodges	157	248	38.8%	41.5%
Love hotel	19	23	45.2%	5%

Chi-square tests revealed statistically significant associations between the registration of tourist accommodation and waste reduction and recycling (χ^2=23.80, p=0.000). As shown in Table 4.14, international tourist accommodation providers had a higher rate of mentioning involvement in such practices (21.6%) than the standard tourist ones (5.4%). A similar observation was evident for the location of accommodation providers and waste management. Chi-square tests showed no statistically significant association between the location and waste reduction and recycling,

but there was a statistically significant association between reducing the use of materials (χ^2=31.23, p=0.000) and the location, where accommodation providers in Kyoto City had more of this attribute (47.9%) than the surrounding prefecture (28.1%).

An independent sample t-test revealed significant differences between TripAdvisor ratings and each of the waste management attributes including waste reduction and recycling (t=-3.73, p=0.000) and reduce the use of materials (t=-3.83, p=0.000). On average, accommodation providers who were involved in waste reduction and recycling had a higher TripAdvisor rating (M=3.47, SE=0.23) than those who did not (M=2.58, SE=0.07). The average TripAdvisor rating for accommodation providers that mentioned reducing the use of materials was higher (M=2.93, SE=0.1) compared to those who did not (M=2.41, SE=0.09).

4.2.5 Voluntary Environmental Programmes

The response attributes of voluntary environmental programme were examined to identify if accommodation providers foster changes in behaviours of guests and employees to undertake environmentally responsible practices. A high majority (75%) of accommodation providers disclosed information on the availability of bicycle hires, public transport, cycling routes, and walking to the tourist sites from an accommodation facility or the way to access to the facility (see Table 4.5). In addition to the above findings, a total of eight (four hotels and four ryokan) out of the total affirmative number of accommodation providers which disclosed environmental education mentioned the installation of electric vehicle (EV) charging station outside of their facility. As shown in Table 4.11, accommodation providers in Kyoto City had a higher rate (87.9%) of mentioning such practices than those in the prefecture (82%). The results revealed a statistically significant association between these variables (χ^2=5.83, p=0.016). A significantly different approach to encourage guests to avoid car usage between locations was that accommodation providers in Kyoto City appeared more involved in offering a one-day pass on the bus network operated within the city, and a promotion of the availability of accommodation packages which included a one-day pass for guests. There was also a statistically significant association between location and environmental education (χ^2=8.40, p=0.004). Accommodation

providers in the city had a higher rate of stating participation in environmental education (15.3%) than those in the prefecture (8.3%).

Table 4.11 Location of establishment and voluntary environmental programmes

Location of establishment	Freq		% of total location that mentioned	% of total affirmative category
	Yes	No		
Provide information on public transport, walking and cycling routes				
Kyoto City	550	76	87.9%	70.7%
Outside of the city	228	50	82%	29.3%
Total	*778*	*126*	*86.1%*	*100%*
Environmental education/incentives				
Kyoto City	96	530	15.3	80.7
Outside of the city	23	255	8.3	19.3
Total	*119*	*785*	*13.2%*	*100*

Table 4.12 illustrates voluntary behavioural attribute frequencies and percentages by accommodation type. The provision of information with respect to encouraging guests to walk, bike, and use public transport, was more prominent among hotels (95.1%), in comparison to ryokan (89.6%), lodges (85%), and love hotels (31%). This association between this response attribute and the accommodation type was statistically significant (χ^2=123.76, p=0.000). The second response attribute of voluntary environmental programme, environmental education and incentives for guests and employees, also revealed more prominent among hotels (18.4%), compared to lodges (17%) and ryokan (5.9%). The results indicated a statistically significant association between these variables (χ^2=28.70, p=0.000). The majority of the lodges appeared more involved in promoting environmental education to guests and encouraged them to bring their own amenities. Only seven hotels out of the total accommodation providers mentioned their implementation of carbon offsetting schemes for guests on their websites (Table 4.12). The latter two attributes were not mentioned on any of the love hotels' websites examined.

There were no statistically significant differences between TripAdvisor ratings and the attributes of the voluntary environmental programmes, with the exception of carbon offsetting schemes. An independent sample t-test revealed a significant difference between TripAdvisor rating and

carbon offsetting schemes (t=-7.85, p=0.000). Accommodation providers who mentioned participation in such schemes had a higher TripAdvisor rating (M=3.86, SE=0.14) than those who did not (M=2.61, SE=0.07).

Table 4.12 Voluntary behavioural change by type of establishment

Response attribute	Freq		% of total category that mentioned	% of total affirmative category
	Yes	No		
Provide information on public transport, walking and cycling routes				
Hotel	176	9	95.1%	22.6%
Ryokan	245	27	89.6%	31.5%
Lodges	345	60	85%	44.3%
Love hotel	13	29	31%	1.7%
Environmental education/incentives				
Hotel	34	151	18.4%	28.6%
Ryokan	16	256	5.9%	13.4%
Lodges	69	336	17%	58%
Love hotel	0	42	0%	0%
Carbon offsetting schemes				
Hotel	7	178	3.8%	100%
Ryokan	0	272	0%	0%
Lodges	0	405	0%	0%
Love hotel	0	42	0%	0%

4.2.6 Internal Environmental Practices

Internal environmental practices were the least mentioned dimension of response attributes on accommodation providers' websites (see Table 4.5). A total of 27 (2.99%) accommodation providers indicated that they had implemented an EMS, either KES or ISO14001, on their websites. The majority of the accommodation providers having the EMS in place also mentioned their environmental policy statement and targets and benchmarking, as these attributes were included in the procedure of implementing EMS. However, only five accommodation providers (four hotels and one lodging facility) explicitly disclosed the target and benchmarking for their environmental practices. The same values were identified from monitoring of environmental performance that the same four hotels and one ryokan had the online disclosure of reporting their actual implementation levels of environmental practices.

Chi-square tests revealed statistically significant associations between accommodation types and all the attributes of the internal environmental practices. Higher percentages of these attributes were mentioned among hotels in comparison to other accommodation types. For example, as displayed in Table 4.13, a higher percentage (8.6%) of hotels revealed their involvement in the EMS, followed by ryokan (3.7%) and lodges (0.2%), and this association was statistically significant (χ^2=37.70, p=0.000). Similar associations were also found between accommodation type and environmental targets and benchmarking (χ^2=46.10, p=0.000); review the environmental performance (χ^2=31.83. p=0.000); community-oriented activities (χ^2=40.41, p=0.000); and environmental conservation projects (χ^2=43.91, p=0.000). Furthermore, environmental management policy was disclosed more prominently among hotels (18.4%) than ryokan (3.3%), lodges (0%), and love hotels (0%), indicating a statistically significant association (χ^2=99.35, p=0.000). These attributes were not mentioned on any of the love hotels' websites.

Table 4.13 EMS by accommodation category

Accommodation type	Freq		% of total category that mentioned	% of total affirmative category that mentioned
	Mentioned	Not mentioned		
Hotel	16	168	8.6%	59.2%
Ryokan	10	262	3.7%	37%
Lodges	1	404	0.2%	3.7%
Love hotel	0	42	0%	0%

All the attributes of the internal environmental practices were more prominently communicated by the international accommodation providers than the standard ones (Appendix E). For example, a higher percentage of the international accommodation providers (25%) disclosed their environmental management policy than the standard ones (5.7%). This association was statistically significant (χ^2=31.08, p=0.000). A similar association (χ^2=33.59, p=0.000) was also evident in environmental targets and benchmarking that a higher rate of the international accommodation providers (21.9%) mentioned this attributes on their websites than the standard ones (3.8%). Other attributes were also prominently mentioned by the international accommodation providers as a statistically significant association was found between the tourist accommodation registration and the implementation of EMS (χ^2=21.22, p=0.000); reviewing and

monitoring their environmental performance (χ^2=27.54, p=0.000); community-oriented activities (χ^2=4.05, p=0.044); and environmental conservation projects (χ^2=7.32, p=0.007). In terms of location, chi-square tests revealed a statistically significant association between location and monitoring of environmental performance (χ^2=5.38, p=0.020). A higher percentage of accommodation providers outside of the city (5.4%) were involved in such a practice than those in the city (2.4%).

Independent sample t-tests revealed significant differences between the TripAdvisor ratings and each of all the attributes including environmental policy (t=-6.32, p=0.000); EMS (t=-4.55, p=0.000); environmental targets and benchmarking (t=-3.00, p=0.000); monitoring environmental performance (t=-4.58, p=0.000); local community involvement (t=-3.85, p=0.000); environmental conservation projects (t=5.94, p=0.000). For example, on average, accommodation providers who mentioned participation in environmental conservation activities had a higher TripAdvisor rating (M=3.91, SE=0.21) than those who did not (M=2.58, SE=0.07). The similar mean values were also found in the other attributes.

4.2.7 Climate Change-Related Keywords

A total of 96 (10.62%) accommodation providers mentioned climate change-related keywords on their websites (Table 4.5). As shown in Table 4.14, a higher percentage (23.8%) of hotels' websites contained such keywords, followed by ryokan (9.9%), lodges (5.9%), and a love hotel (2.4%). The result indicated a statistically significant association between accommodation types and climate change-related keywords (χ^2=46.32, p=0.000).

Table 4.14 Climate change-related keywords and accommodation type

Accommodation type	Freq		% of total category that mentioned	% of total affirmative category that mentioned
	Mentioned	Not mentioned		
Hotel	44	141	23.8%	45.8%
Ryokan	27	245	9.9%	28.1%
Lodges	24	381	5.9%	25%
Love hotel	1	41	2.4%	1%

An independent sample t-test revealed a significant difference between TripAdvisor ratings and the mention of climate change-related keywords (t=-2.43, p=0.016). As Table 4.15 illustrates, on average, accommodation providers who mentioned such keywords had a higher TripAdvisor rating (M=3.05, SE=0.18) than those who did not (M=2.57, SE=0.07).

Table 4.15 Climate change-related keywords and TripAdvisor ratings

TripAdvisor rating	Mentioned	Not mentioned	% mentioned of rating
No TripAdvisor rating	23	271	7.8%
TripAdvisor rating of 1	0	7	0%
TripAdvisor rating of 1.5	0	1	0%
TripAdvisor rating of 2	0	8	0%
TripAdvisor rating of 2.5	1	12	7.7%
TripAdvisor rating of 3	3	32	8.6%
TripAdvisor rating of 3.5	16	80	16.7%
TripAdvisor rating of 4	25	165	13.1%
TripAdvisor rating of 4.5	25	143	14.9%
TripAdvisor rating of 5	2	48	4%

To gain a better understanding of which climate change-related keywords were addressed on accommodation providers' websites, the keywords were extracted from reviewed accommodation website content and categorised according to three themes. These included climate change-related topics or issues, observed climate change impacts, and human responses to climate change (see Table 4.16). The latter two themes had the same and higher percentages (40.9%) than the first theme (18.3%). Global warming was the most commonly mentioned among the first theme on the accommodation websites, whilst extremely hot weather and CO_2 emissions reduction were the most prominent among the latter two themes, respectively. Only two accommodation websites mentioned CO_2 emissions from accommodation in relation to tourism-specific climate change. (Table 4.16).

Table 4.16 Climate change-related keywords on the accommodation providers' websites

Theme	Freq*	% mentioned of keywords (Out of 164)
Climate change-related topics or issues		
climate change	7	4.2
global warming	20	12.2
CO2 emissions from accommodation	2	1.2
fossil fuel	1	0.6
Total	*30*	*18.3*
Observed climate change impacts		
extreme weather events	17	10.4
extremely hot weather	36	22
late colouring of maple leaves	7	4.3
Early flowering of cherry blossoms	3	1.8
loss of seasonality	1	0.6
SLR	1	0.6
Rise of the sea surface temperature	1	0.6
heat-island effect	1	0.6
Total	*67*	*40.9*
Human responses to climate change		
Kyoto Protocol	8	4.9
Paris Agreement	3	1.8
climate change mitigation and adaptation	4	2.4
climate change mitigation	17	10.4
CO2 emissions reduction	26	15.9
carbon offsetting	2	1.2
GHG emissions reduction	5	3
low carbon society	2	1.2
Total	*67*	*40.9*
Grand Total	***164***	*100*

*Calculation included more than one keywords which were retrieved from the same accommodation websites

Table 4.17 provides a more detailed breakdown of the keywords based on type of establishment. Human responses to climate change was the most commonly mentioned keywords among hotels in comparison to the other themes, as well as accommodation types. The rest of the accommodation types mentioned observe climate change impacts more prominently than other

themes. Only one love hotel was found to mention the climate change-related keyword on the website.

Table 4.17 Three themes of climate change-related keywords and accommodation type

Theme	Frequency*			
	Hotel	Ryokan	Lodges	Love hotel
Climate change-related topics or issues				
climate change	6	0	1	0
global warming	8	8	4	0
CO2 emissions from accommodation	2	0	0	0
fossil fuel	0	0	1	0
Total	*16*	*8*	*6*	*0*
Observed climate change impacts				
extreme weather events	6	6	5	
extremely hot weather	8	15	12	1
late colouring of maple leaves	2	3	2	0
Early flowering of cherry blossoms	1	0	2	0
loss of seasonality	0	1	0	0
SLR	0	1	0	0
Rise of the sea surface temperature	0	1	0	0
heat-island effect	0	1	0	0
Total	*17*	*28*	*21*	*1*
Human responses to climate change				
Kyoto Protocol	4	2	2	0
Paris Agreement	3	0	0	0
climate change mitigation and adaptation	4	0	0	0
climate change mitigation	14	0	3	0
CO2 emissions reduction	20	2	4	0
carbon offsetting	2	0	0	0
GHG emissions reduction	4	1	0	0
low carbon society	2	0	0	0
Total	*53*	*5*	*9*	*0*

*Calculation included more than one keywords which were retrieved from the same accommodation websites

In terms of the location, accommodation providers in Kyoto City had a higher rate (13.3%) of stating climate change-related keywords than those located outside the city (4.7%). The result indicated a statistically significant association between location and climate change-related

keywords (χ^2=14.94, p=0.000). However, no significant association was found between the registration of tourist accommodation and climate change-related keywords.

4.3 Chapter Summary and Conclusions

The results of this study shed light on the responses of Japanese accommodation providers to climate change. The content analysis showed that certain attributes, such as offering low carbon food and information on public transport and walking and cycling routes for tourists, were the most commonly mentioned by accommodation providers. The other response attributes mentioned on the accommodation websites with less than one-sixth, and one attribute of energy conservation was not mentioned on any of the websites.

Response attributes were also associated with the type, location, and tourist registration of accommodation providers. Significant differences were identified between the average of TripAdvisor ratings and some attributes, although there were no differences between the love hotel ratings and attributes. The next chapter will discuss the significance of the research findings.

Chapter 5: Discussion

5.1 Introduction

The dynamics of the global tourism system currently plays a powerful role as an economic, social and environmental force of many regions (Scott & Gössling, 2015). This is particularly evident in Asia, which has become the world's fastest growing region for international and domestic tourism today (UNWTO, 2016). This highlights not only the wider economic importance of Asia as a key tourism region, but also the fact that such growth is also simultaneously contributing to climate change through GHG emissions from tourism (Hall, 2016b; Su & Hall, 2014).

Climate change is arguably one of the greatest challenges to Asian tourism's relationship to the environment, since the region's tourism industry is highly vulnerable and has already been negatively affected by climate change (Hall, 2016b, UNWTO, 2014). The Asian accommodation sector is regarded as being one of the sub-sectors which is responsible for the third largest share of accommodation emissions with a projection of the highest rate of emissions growth in the future (WEF, 2009), due to a significant growth in accommodation capacity (Scott & Gössling, 2015).

Japan's accommodation establishments are one of the key players among Asian countries to respond to climate change (Iwabuchi et al., 2004; Kyoto GPN, 2010; Niga et al., 2002). However, given the limited research that has been undertaken on climate change and Japan's accommodation businesses, there is a need to investigate their environmental performance to understand the extent to which they implement green practices in response to climate change.

The purpose of this research was to study the current status of Japan's accommodation providers' climate change responses and explore what attributes are implemented in practice. This was undertaken by specifically examining the case of accommodation providers in the city of Kyoto. Content analysis of corporate websites and other units of analysis, including blogs and CSR reports, of Japanese accommodation providers in Kyoto were applied to identify the presence of attributes. This chapter concludes with a discussion of the major findings of the study.

5.2 Response Attributes and the Environmental Dimensions

As indicated in the findings in Chapter 4, behavioural change appeared to be the most popular dimension mentioned among the accommodation providers in responding to climate change, whereas internal environmental practices were the least mentioned in terms of the average frequency. This is in line with the findings by Mensah (2014) that eco-labelling and certification schemes were the areas with the worst environmental performance of accommodation establishments.

The implementation rate of adaptation and mitigation actions by accommodation providers in response to climate change is also varied with respect to the response attributes. Most commonly mentioned green practices among accommodation providers in Kyoto appeared to be the provision of low carbon food and information on public transport and walking and cycling routes for guests. These two attributes accounted for over half (54.65% and 75%, respectively) of the total accommodation providers mentioned on the websites. The third highest rate of attribute mentioned was the reduction of the use of materials, representing 41.7%. However, the results indicate a low overall rate of reported other attributes. The absence of these attributes may support the findings of Jenkins and Karanikola (2014), who suggest that environmental information disclosure is deemed a low priority for accommodation businesses as they do not make the best use of their websites to communicate such information.

With regard to the least mentioned attributes, only one accommodation website of the 904 accommodation websites examined mentioned the implementation of a water-recycling programme. This is consistent with the study results of Kyoto GPN (2010) that water recycling practices had very low implementation levels among water conservation measures by Japanese accommodation providers. Similarly, Nelson's (2010) content analysis of eco-certified accommodation websites which appeared less engaged in carbon offsetting schemes are supported by the present findings. Japanese accommodation providers' lack of explicit statements about their targets and monitoring of their environmental performance also link to the findings of de Grosbois (2012) that only a small number of hotel companies provide detailed online information about specific measures aimed at achieving environmental goals and, to an

even lesser extent, their actual performance achieved through implementing CSR initiatives is reported. De Grosbois (2012) further suggests that much of hotel companies' online disclosure of CSR is overly smple and simplistic. A similar conclusion with respect to hotel companies' environmental disclosure practices was reached by Holcomb et al. (2007) and Hsieh (2012) who found that only less than half of the hotel companies examined providing their mission statements and visions of social responsibility practices or explicit environmental policy statements on their websites.

5.3 Response Attributes among Accommodation Types

Differences exists with respect to most common measures mentioned on the websites among different accommodation categories. Three specific dimensions which hotels prominently disclosed while the other three accommodation types mentioned less on their websites were energy, water, and waste conservation. Previous studies indicate that these three key areas are hotels' most popular sustainable practices (Chan et al., 2017; de Grosbois, 2011; Kyoto GPN, 2010; Priego & Palacios, 2008; Richins & Scarinci, 2009; Sloan, Legrand, Tooman & Fendt, 2009; Wan, 2007). A number of studies have identified that the primary motivation factors for their implementation of such practices involve cost savings and response to environmental concerns, as well as simplicity in sustainable practice implementation and operation (Ali et al., 2014; Bohdanowicz, 2005; Dodds & Holmes, 2011; Erdoğan, 2007; Fotiadis, Vassiliadis & Rekleitis, 2013; Graci & Dodds, 2008; Javis & Ortega, 2010; Leslie, 2009; Levy & Park, 2011; Mishra, 2016; Niga et al., 2002; Su et al., 2013; Tanaka, 1999; Ueoka & Kanaya, 2012; Wan et al., 2017; Warnken et al., 2005).

Furthermore, there is a higher rate of hotels implementing specific practices among the affirmative category, for example, having an EMS in place, installing monitoring systems, and using alternative and/or RE sources, which entail high installation and operating costs as well as familiarity of their existence (Bohdanowicz, 2006; Chan, 2011; Erdogan & Tosun, 2009; Nicholls & Kang, 2012). These findings of this study could be associated with firm size which influences sustainable practices of accommodation establishments (Ali et al., 2014; Álvarez Gill, Jiménez & Lorente, 2001; Chan, 2013; Dalton et al., 2007; Mensah & Blankson, 2013; Su et al., 2013). Larger-

sized accommodation facilities appear more involved in environmental management practices (Park, Kim & McCleary, 2014; McNamara & Gibson, 2008; Sánchez-Medina, Díaz-Pichardo & Cruz-Bautista, 2016). Due to their greater capital and strong organisational culture, they have an increased capacity to execute more effective and long-term environmental initiatives in response to environmental concerns and climate change (Erdoğan, 2007; Mackenzie & Peters, 2014; McNamara & Gibson, 2008). Indeed, most of the attributes were more prominently mentioned among international accommodation providers than standard accommodation providers. As Jenkins and Karanikola (2014) note, larger hotel companies are more committed to information disclosure of green initiatives on their websites. This was reflected in their findings that a higher rate of keywords in relation to human responses to climate change were contained among hotels. However, Font et al. (2012) argue that while, in general, larger hotel companies disclose CSR policies more comprehensively, they are also accompanied by substantial gaps in implementation, which has been termed as a 'disclosure-performance gap'.

Firm size also appears to have an impact on green practices of ryokan operations. Ryokan revealed more of low carbon food attributes amongst accommodation categories, and it is consistent with the finding of the Kyoto GPN (2010) study that ryokan have a higher implementation rate of using seasonal and locally sourced food and beverage than hotels. This finding is also supported by Nicholls and Kang's (2012) study that small-sized accommodation providers are more likely to have implemented green purchasing with the time and effort invested in obtaining food and beverage which is locally produced or organic. Another possible explanation for ryokan's higher engagement in local and seasonal foodstuff could be their greater emphasis on optimising local identity and authenticity in their branding and promotional strategies. As the ryokan sector is embraced by the local atmosphere of tradition and culture (UNWTO & KCTI, 2016), locally and seasonal sourced food and beverage products are integral to creating and offering such service experiences to customers, as a factor in the attractiveness of ryokan (Cooper, 2013; Jimura, 2011).

Lodges appeared to be more involved in reducing the use of materials, environmental education of guests, reusable towel/linen programmes, and reducing the need for energy use. This could be significantly related to the extent of availability of service offerings and facility standard based on

the accommodation category. For example, the majority of lodges' websites mentioned that they do not provide towels or change linen unless a request is made by guests or they charge for rental towel purchases in their facility. Another possible explanation for this could be a fewer facility criteria for lodging operations compared with hotels and ryokan (see also Table 3.1 in Chapter 3). This may allow for lodges to have more flexibility to exert, for example, a more conventional approach in removing in-room electrical appliances.

Interestingly, the results of this study clearly shows a substantial gap in online communication of the response attributes between love hotels and other types of accommodation establishments. Although love hotels' high implementation level was found with respect to reducing the use of materials and the provision of information on public transport, the rest of the response attributes were rarely mentioned on the websites. One possible explanation for this could be a difference in operational styles given that love hotels are more entertainment-oriented accommodation facilities. They provide the minimum information required to communicate through corporate websites regarding their service offerings and features, and pay little attention to environmental information disclosure. Notably, only one love hotel website contained climate change-related keywords.

5.4 Location and Response Attributes

Environmental information disclosure on the websites was also found to differ according to the location. Accommodation providers in Kyoto City appeared more involved in communicating their environmental information than those outside the city. This may potentially relate to the EMC programme that aims to transform Kyoto City into a low-carbon society. The influence of such programmes on green practices is particularly evident in promotions on one-day pass on the bus network operated in the city to encourage guests to use public transport and the offering of accommodation package products using the one-day pass or rental bike to explore the tourist sites. As Gronau (2016) suggests, the concept of guest tickets which provide tourists with free access to the public transport creates opportunities to reduce the ecological impacts of transportation within the destination as well as traffic congestion, requires support from local tourism businesses including accommodation (see also Hall, Le-Klähn & Ram, 2017).

5.5 TripAdvisor Ratings and Response Attributes

Although about one-third of the accommodation websites analysed, excluding love hotels, did not have TripAdvisor ratings, the study findings revealed differences among the ratings in terms of online communication of green practices. The accommodation providers' rating appeared to influence a positive response to certain attributes of their environmental initiatives, such as the installation of water-saving devices, waste management, and the EMS. Accommodation providers which were highly rated on TripAdvisor appeared more engaged in online communication of green practices. This may be associated with the finding of hotels' sustainable practices and online travel review websites by Kim, Hlee and Joun (2016) that high intensity of sustainable practices enhance the level of customer satisfaction, but in an indirect way through their quality perception.

5.6 Conclusion

This study examined the extent to which response attributes were undertaken by accommodation providers in Japan. The content analysis of online communication of accommodation providers in Kyoto Prefecture indicates that very little information is made available by providers of the advised measures in response to climate change by UNWTO et al. (2008) and previous studies. Instead, more specific attributes such as the offering of low carbon food and the encouragement of guests to use non-motorised and public transport were mentioned more prominently on the accommodation websites. There also appeared to be substantial gaps in environmental information disclosure between the accommodation types, by location, size, and online review rating.

Chapter 6: Conclusion

Tourism development is economically significant to many regions. However, a greater focus on tourism growth is also accompanied by associated local and global concerns over the extent that tourism is both impacted by, and a significant contributor to, environmental and climate change. Such issues have placed increased pressure on the tourism sub-sectors in regions with high GHG emissions, especially the Asian accommodation industry (Hall, 2016b; Su & Hall, 2014). This is also the case of Japan, which has experienced a recent inbound tourism boom with an increasing number of overnight visitors staying in the formal accommodation sector, while simultaneously being extremely vulnerable to climate change impacts as well as significantly contributing to GHG emissions. Accordingly, the purpose of this study is to examine the online attributes of Japanese accommodation providers with respect to their responses to climate change. This is done in a specific location, Kyoto, a city which has given its name to one of the most important climate change conventions. As noted in Chapters 4 and 5, the study results lead to an improved understanding of the online communication of the green practices of accommodation providers. This chapter provides a summary of the academic contributions of the study, followed by managerial implications. It concludes with a discussion of some of the limitations of the study as well as suggestions for future areas of research in the field of tourism and climate change.

6.1 Contribution to Knowledge

This study provides some insights with regard to environmental information disclosure in response to climate change by different types of Japanese accommodation providers. Hence, this study contributes to fulfilling a key knowledge gap with respect to tourism responses to climate change in Japan and other Asian nations (Amelung et al., 2008; Becken 2013a; Hall, 2008; Scott et al., 2016; Su & Hall, 2014; UNWTO et al., 2008). By exploring Japanese accommodation providers' online communication about their current efforts to respond to climate change and environmental issues, this study has identified the specific areas of environmental management measures mentioned on the accommodation websites, whilst very little information was offered to the public with respect to other response attributes. The inclusion of the unique Japanese hotel sector, love hotels, and the traditional cultural accommodation sector, ryokan, is also a valuable

contribution to help further advance the body of literature dealing with climate change and accommodation in the Japanese context.

In addition, the explicit integration of non-English language knowledge by the inclusion of Japanese journals and grey literature makes a significant contribution to advancing knowledge production on climate change and tourism (Becken, 2013a). Given the fact that English is the dominant language of international publishing (Baruch, 2001; Becken, 2013a; Hall, 2013; Truong, Dang, Hall & Dong, 2015), this study is an important step in bridging a gap between English and non-English literature in the Asian and Japanese context.

6.2 Managerial Implications

Based on the findings of this study, a number of key implications for practice in implementing green measures of the Japan's accommodation sector are identified.

6.2.1 Clear Communication of Environmental Information

Foremost, if the nation's accommodation providers wish to pursue an environmentally sustainable way, each accommodation type needs to explicitly disclose their green practices, as well as publically monitoring the progress of their environmental performance in order to ensure the achievement of goals and benchmarks. With the increased popularity of Internet usage in consumer and business markets, the optimisation of the accommodation websites to communicate their environmental information needs to be integrated into marketing and management of environmental conservation. This study has also addressed an issue of current CSR reporting practice in Japan's accommodation providers which needs to be improved. This research also serves as a guideline for accommodation providers which could emphasise their involvement in green practices, particularly in the areas that are reported to a lesser extent. It would be a starting point to explicitly communicate their practices which are operated in an environmentally sustainable manner. As the inbound tourism market has become increasingly becoming significant in Japan (see Chapter 1), environmental information disclosure in non-Japanese languages may be worthwhile in communicating to foreign markets.

6.2.2 Optimisation of Accommodation Characteristics

The study findings suggest that there is a significant potential for each type of accommodation category to undertake adaptation and mitigation measures. Many accommodation providers have not yet implemented green practices and improved standards could encourage the adoption of appropriate practices. For example, lodges could utilise their facility standard to offer a minimum amount of amenities and phase out electrical appliances from guest rooms. Lodges which do not offer meals could introduce eating options which use organic and locally sourced food products and beverage for guests.

6.2.3 Pursuit and Promotion of Kyoto as an Eco-City

If Kyoto City aims to achieve its targets for GHG emission reduction and promote itself as an environmentally sustainable society, the city government needs to facilitate a more active collaboration with accommodation businesses. It is essential that the government takes a more active role in enhancing the accommodation sectors awareness of the EMC programme as well as climate change issues in order to promote behavioural change. The findings from the content analysis suggest that although accommodation providers in the city appeared more involved in sustainable practices and higher recognition of climate change-related issues and responses than the surrounding prefecture, such practices are still mentioned only a very limited number of accommodation providers. Environmental initiatives for accommodation businesses created by the city government are currently limited to energy conservation. Therefore, such initiatives need to be expanded in terms of advice as to what sort of energy-saving practices accommodation providers are required to take, as well as additional potential climate change mitigation and adaptation measures. This is in line with the findings of a case study of the EMC programme in Toyama City by Gudmundsson, Hall, Marsden and Zietsman (2016) that more comprehensive dimensions and multi-sectional approaches to sustainable measures are needed to be covered in the implementation of the programme, together with the national government support to reduce overall emissions.

It is also clear from the study findings that there is a gap of involvement in environmental practices reveals between love hotels and the other three accommodation categories. Therefore,

an important implication of this study is the need to include love hotels in environmental initiatives. Such accommodation forms are excluded from the category of Japanese accommodation establishments, due to different accommodation business operation laws, but since tourists have been using love hotels as budget accommodation (see Chapter 3), they need to be taken into included in initiatives.

The above points also apply to other regional areas which are not part of the EMC programmes. Given that accommodation providers in the surrounding prefecture appeared less engaged in green practices, such environmental initiatives need to be established at the prefectural level. Environmental education programmes would be essential to promote accommodation providers' behavioural change with respect to environmental conservation and climate change.

6.2.4 Establishing an Official Environmental Rating System

Unlike other nations' official environmental rating systems such as a New Zealand's Qualmark environmental rating (Qualmark, n.d.) and TripAdvisor's GreenLeaders Program (TripAdvisor, n.d.), there is an absence of environmental rating systems of accommodation facilities in Japan. This represents a significant lack of progress in enhancing environmental awareness and incentives of accommodation providers to be more environmentally sustainable in their daily operation. The application of such environmental systems may serve as one potential information channel to make their environmental performance highly visible to the public domain.

6.3 Limitations

Careful consideration was taken in the creation and development of this study. However, several limitations arose during the research process. The first key limitation was that the study focused only upon environmental information of accommodation providers who had their own corporate websites. This hindered the collection of data resulting in a relatively small number of love hotels. Also, as is the nature of content analysis of already recorded communications, this study is based on information available on websites as of November 2016. Web pages may have since changed by the adding of new information and/or deleting of existing information.

Furthermore, the data collected in this study was limited to the only attributes which were sought from the websites available to the public. This might leave some response attributes which might have undertaken by accommodation providers but not disclosed on their websites unaccounted for. Hence, using content analysis alone could make validation of accommodation providers' actual practices difficult. As noted below, employing a combination of other research means is needed as a way to ameliorate these limitations, so that research findings can be cross-validated (Berg, 2007). This could help identify the extent of the gap between the content accommodation providers' mention with respect to environmental performance on their websites and the implementation of their actual practice.

A lack of clear legal classification between hotels and ryokan was a major problem with identifying distinctions between them when coding accommodation type. As Guichard-Anguis (2009) and the UNWTO and KCTI (2016) describe, in many cases, there is no connection between the type of accommodation facilities and their name. For example, an accommodation establishment called 'hotel' can be categorised into ryokan. Such ambiguity may affect the correct allocation of accommodation type, and in order to minimise such concerns, the online sources which were used to compile listings of accommodation providers were utilised to verify accommodation type.

6.4 Suggestions for Future Research

A number of suggestions have been identified from this study that may hold a significant potential for future research into the topic of climate change and tourism. This research was conducted only at a Master's level using content analysis to examine the Japanese accommodation industry's responses to climate change in terms of adaptation and mitigation measures. An obvious first recommendation is therefore to apply other research methods, particularly focus groups and interviews. It is important to note that the majority of studies which were undertaken by Japanese researchers, for example, Kyoto GPN (2010), Niga et al. (2002), and Ueoka and Kanaya (2012), employed surveys as their dominant form of data collection. This underlines that more qualitative approaches are required to build an in-depth look at Japan's accommodation providers' opportunities and challenges of their adaptive capacity of adaptation and mitigation measures.

A second suggestion is to undertake a comparative analysis between prefectures and/or regions of Japan. This study focused on a single prefecture, Kyoto, which is regarded as one of the "golden routes" as well as the city itself as being part of the selected EMC city. Comparative studies of the response of the nation's accommodation providers to climate change could be explored in future research, for example, between different EMC cities and/or regional areas and urban cities. To widen the scope, future research should also conduct a comparative analysis between countries. Such studies could allow for identifying the Japan's accommodation providers in terms of the level of implementation of climate change mitigation an adaptation measures compared to other countries.

Another area of analysis to recommend for comparative studies is to compare the level of awareness, attitudes, and behaviour with respect to climate change responses between accommodation types. The results revealed that the mention of climate change-related themes differed across accommodation categories. There is therefore a clear need for a more in-depth analysis of their sustainable behaviour and actual implementation.

A further suggestion is examining different types of accommodation that have not yet been studied in the field of climate change and tourism research. This would help gain insights into the identification and development of guidance on what initiatives to take across different types of accommodation in order to respond to climate change and environmental concerns and how these initiatives can be translated into action. One of the potential accommodation types which could be explored for future research is heritage accommodation businesses. As Hall (2016a) points out, there is a relative dearth of research on the climate change and heritage tourism, particularly cultural heritage. An example of the study investigating includes Coles et al.'s (2015) study of environmental performance historic properties for small accommodation in the South West of England. Such accommodation also exists in Japan in the form of cultural properties or properties of important cultural landscapes.

Finally, there is a need for paying more and continuous attention on climate change assessments in a Japanese tourism, and in a wider vein, the Asian tourism context. The availability of a greater access to updated information is also recommended with respect to consumption patterns and

emissions from Japan's tourism businesses including accommodation in both Japanese and English.

6.5 Conclusion

This study aimed to examine the current state of mitigation and adaptation measures by accommodation providers in Japan in response to climate change. Given the relative dearth of information on this topic, in both Japanese and English, this is the first study in the tourism field exploring this area of enquiry.

The study results identified the specific areas of environmental practices reported on the websites of accommodation providers, however, little information was provided to the public domain. It is recommended that accommodation providers in Japan take a more environmentally sustainable approach to optimise their websites in order to disclose green practices explicitly as well as their awareness of climate change-related issues. Significant gaps of involvement in such practices between accommodation types and location highlight the urgent need of city and prefectural government to take a more holistic approach to develop environmental initiatives in response to climate change for the accommodation industry in Japan.

The accommodation industry is already making a significant contribution to climate change and its emissions growth is projected to continue to grow in the foreseeable future. This presents a major and ongoing challenge to the sustainable operation of Japan's accommodation industry and, as this thesis has presented, its capacity to effectively communicate its sustainable practices to its customers via its online content.

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Appendix A: Content Analysis Coding

Coding Key:

In all categories:
Not Mentioned = 0
Yes = 1
Not provided= 3

Region
Kyoto City = 1
Outside of the city = 2

Type of accommodation
Hotel = 1
Ryokan = 2
Lodges = 3
Love Hotel = 4

TripAdvisor rating
No rating = 0
1 = 1
1.5 = 1.5
2 = 2
2.5 = 2.5
3 = 3
3.5 = 3.5
4 = 4
4.5 = 4.5
5 = 5

Love hotel rating
No rating = 0
1.9 = 1.9
3.2 = 3.2
3.3 = 3.3

3.4 = 3.4

3.5 = 3.5

3.6 = 3.6

3.8 = 3.8

3.9 =3.9

4 = 4

4.1 = 4.1

4.2 = 4.2

4.3 = 4.3

4.5 = 4.5

4.6 = 4.6

4.7 = 4.7

4.9 = 4.9

Appendix B Coding Frequencies – Water management

Table -- Accommodation providers' water saving measures by location

Response attribute	Kyoto City				Outside of the city			
	Mentioned	Not mentioned	% of total category that mentioned	% mentioned of category	mentioned	Not mentioned	% of total category that mentioned	% mentioned of category
Water-saving devices	23	603	3.7%	92%	2	276	0.7%	8%
Water recycling	0	626	0%	0%	1	277	0.4%	100%
Towel/linen reuse	104	522	16.6%	94.5%	6	272	2.2%	5.5%

Appendix C Coding Frequencies – Green Purchasing

Table – Green purchasing and tourist accommodation registration

Response attribute	International accommodation				Standard accommodation			
	Freq		% of total category that mentioned	% mentioned of attribute	Freq		% of total category that mentioned	% mentioned of attribute
	Yes	No			Yes	No		
Low carbon food	83	5	94.3%	23.4%	271	69	73.4%	76.6%
Fair trade product	1	87	1.1%	100%	0	369	0.0%	0%
Organic product	18	70	20.5%	33.3%	36	333	9.8%	66.7%
Purchase environmentally friendly products	20	68	22.7%	30.3%	46	323	12.5%	69.7%

Appendix D Coding Frequencies of Waste Management

Table – Waste management and tourist accommodation registration

Response attribute	International				Standard			
	Freq		% of total category that mentioned	% mentioned of attribute	Freq		% of total category that mentioned	% mentioned of attribute
	Yes	No			Yes	No		
Waste reduction and recycling	19	69	21.6%	48.7%	20	349	5.4%	51.3%
Reduce the use of materials	45	43	51.1%	22.3%	157	212	42.5%	77.7%

Appendix E Coding Frequencies of Internal Environmental Practices

Table – Internal environmental practices and tourist accommodation registration

Response attribute	International				Standard			
	Freq		% of total category that mentioned	% mentioned of attribute	Freq		% of total category that mentioned	% mentioned of attribute
	Yes	No			Yes	No		
Implement environmental policy	22	66	25%	51.2%	21	348	5.7%	48.8%
EMS	14	74	15.9%	53.8%	12	357	3.3%	46.2%
Environmental targets and benchmarking	19	69	21.9%	57.6%	14	355	3.8%	42.4%
Review the environmental performance	16	72	18.2%	57.1%	12	357	3.3%	42.9%
Community-oriented activities	11	77	12.5%	32.4%	23	346	6.2%	67.6%
Involve in environmental conservation projects	10	78	11.4%	40%	15	354	4.1%	60%